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DEVOTED TO INDUSTRIAL PSYCHOLOGY

The Science of Work, the Human Factor in Management and the Satisfactory Adjustment of Individuals to Their Occupations

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News Notes Book Reviews Current Periodicals

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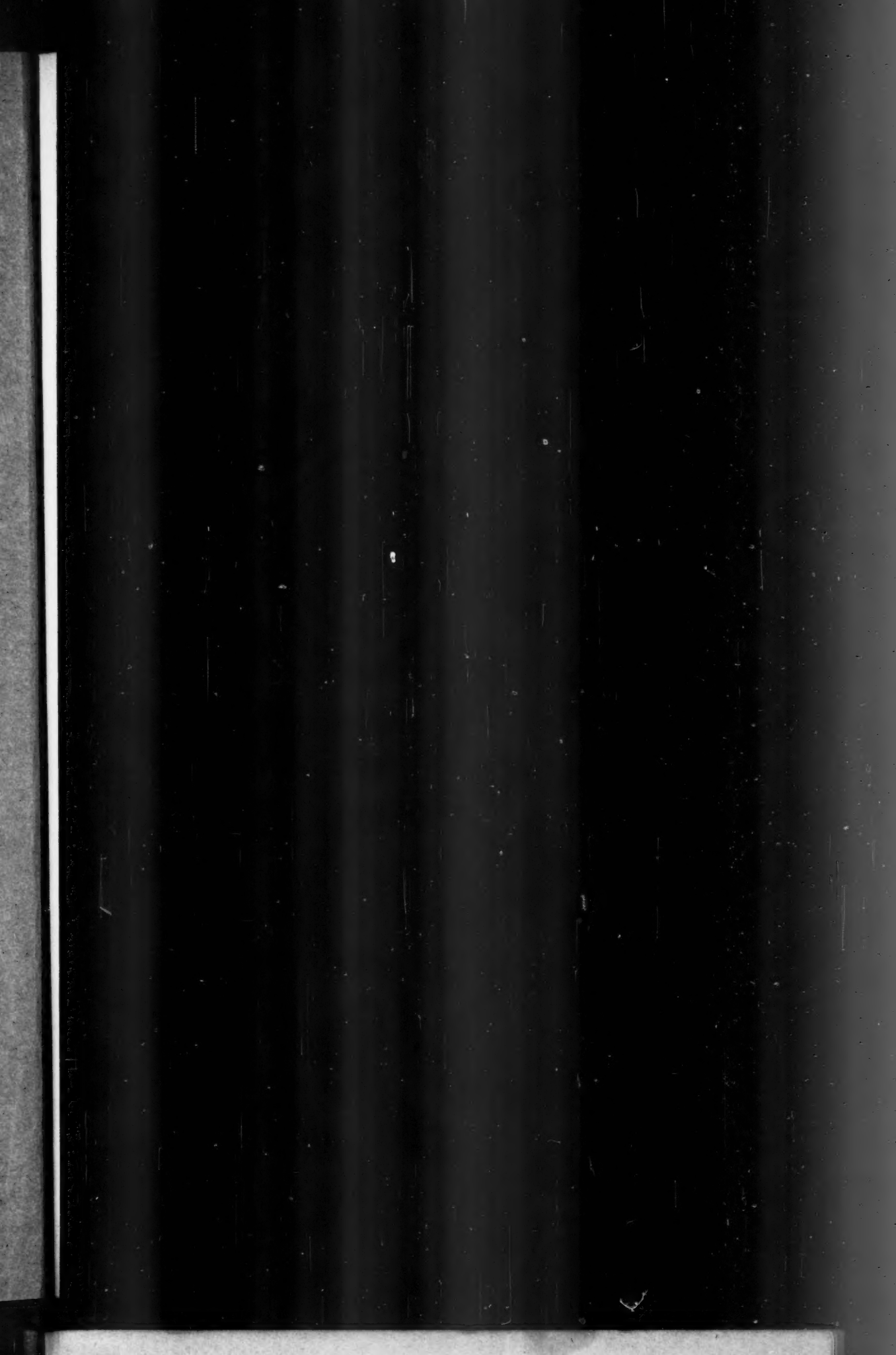

Boredom in Industry

By S. Wyatt, *London*

In the great factories of Manchester and other industrial centers of England, Mr. Wyatt as an investigator for the Industrial Fatigue Research Board has for several years been engaged in studying repetitive work. Here he summarizes what he has learned about one of the major problems of industrial psychology growing out of extreme specialization and subdivision of labor; namely, the problem of boredom: its incidence, extent, causes and remedies.

This paper summarizes the results of experimental enquiries into the nature and causes of boredom and suggests remedies for it in the case of factory machine operators engaged in repetitive work. Individual differences determine in large measure the degree of boredom experienced. The existence of noted variations in intelligence, temperamental tendencies, and ability to mechanize a task provides important problems for future research. Not all workers are subject to boredom but after two hours at the same task most operators become restless and continue work with effort or reduced efficiency. Boredom is experienced less in the afternoon than in the morning. The mechanisms underlying boredom appear to be illuminated by a temporal illusion noted in bored workers: time elapsed is overestimated. The nature of the task contributes to boredom: operations involving attention and adjustment in response to varied situations are in general less boring than those requiring only intermittent or partial attention; while tasks so automatized as to permit uninterupted mind wandering seem to produce—in workers temperamentally suited to repetitive work—a minimum of boredom,—which suggests a means for its avoidance. Keeping pace with a rhythmically operating machine; teaching the operator the importance of the work he is doing; supplying material in small lots rather in an endless flow along a belt; improving working conditions, both for the prevention of unpleasant day-dreams about the job and for the development of pride in the organization and satisfaction in the job are all indicated remedies for the dissipation of boredom. Facilities for developing a richer life outside the factory will be provided by employers interested in the development of the worker as a citizen.

BOREDOM is frequently though by no means always experienced by individuals engaged in repetitive work. The occasional visitor to a factory is apt to think that all repetitive processes are monotonous, and tends to regard the operatives with mingled feelings of pity and admiration. A longer and more detailed examination of the conditions of work,

however, begins to reveal variety in the midst of apparent uniformity, and conversation with the operatives often discloses a totally unexpected attitude towards the industrial process. As Münsterberg remarks, "The shepherd knows every sheep, though the passer-by has the impression that they all look alike," and a similar discriminative process seems to occur in connection with the operative and her work.

INFLUENCES PRODUCING BOREDOM

Although the experience of boredom may be less intense than the outsider generally imagines, its existence in some workers is undoubtedly very marked, and the effect on productive activity quite pronounced. Most operatives engaged on repetitive work are apparently able to maintain a satisfactory rate of working during the first two hours of the spell, but then signs of restlessness and a desire for change often begin to appear. The continued performance of the task seems to become increasingly difficult, and efficiency is maintained only at the expense of increased effort. Conversely, if this increased effort is not forthcoming, efficiency suffers. Frequently, however, a compromise between these two conflicting tendencies is effected, and the rate of working is then characterised by alternating phases of effort and relaxation, resulting in a reduction in the average rate of working together with increased variability. The feeling of disagreeableness, or boredom, experienced under such conditions appears to be conditioned by the increasing difficulty of the performance, due to the inhibiting effect of uniformly repeated movements and the increased effort involved in maintaining activity in the face of intruding inclinations.

Operatives frequently work better in the afternoon than in the morning, and their statements indicate that the lower morning output is probably due to the increased effects of boredom in that spell. When activities provide little or no interest, the prospects are depressing and discouraging, and the effect seems to bear some relation to the magnitude of the task to be accomplished. To a person who dislikes walking, the prospects of a twenty mile tramp over uninteresting country may be almost painful, and although he starts with a certain amount of forced effort and enthusiasm, this soon disappears and leaves him in a darkened mood. At this stage the magnitude of the task may seem appalling, but as the time for lunch and rest draws near interest is awakened and depression recedes. The distance still to be traversed now shrinks considerably, and bears little resemblance to the endless trail conceived a few hours before. A new swing and liveliness characterise his step as he again takes to the road, and although these may diminish after a few more miles, they reappear with increased intensity as he enters the lap which separates him from his goal.

A somewhat similar outlook confronts the repetitive worker employed on a comparatively uninteresting process. Enthusiasm and interest are usually at a minimum towards the middle of the morning spell. They are revived by the expected and actual recuperative effects of the mid-day

break, and the diminishing magnitude of the task as the end of the afternoon is approached.

MECHANISM UNDERLYING BOREDOM

The increased variability in the rate of working which is frequently observed about the middle of the spell when boredom is experienced suggests that under such conditions the mechanism concerned with the initiation and control of movement becomes impaired, and while the natural tendency is for the rate of working to be reduced, spasmodic outbursts of energy sometimes bring about the attainment of unusually high speeds. The results obtained under such conditions seem, in fact, to represent the resultant of a conflict between natural desires and volitional effort; sometimes the one, sometimes the other gaining the upper hand. A continuation of this state would, of course, be very fatiguing, but the return of a more favorable attitude, induced by consciousness of the approaching end of work, reduces boredom and facilitates activity. Hence the rate of working often becomes less variable towards the end of the spell, which again is an indication of the transitory effects of boredom experienced earlier in the period of work and evidence of the absence of any appreciable degree of fatigue.

The bored individual is also inclined to over-estimate the duration of time, and this tendency seems to throw some light on the mechanism underlying boredom. A number of laboratory experiments have been conducted on the estimated duration of time-intervals, and it has been found that the results are affected by the number and nature of the experiences they contain. Earlier experiments showed that when a subject is occupied for a short period, the duration of that period almost always appeared to be shorter than a similar interval idly spent. With a longer interval, however, the temporal illusion was said to diminish and to be reversed when the intervals extended beyond a certain point. More recent experiments[1] have shown that the estimation of time-intervals is determined by the amount of mental content experienced during the period and may be independent of the activity performed. Confusion has arisen because investigators have failed to distinguish between external events and subjective experiences. It is possible, for instance, for the industrial worker to be fully occupied in manipulative activity while her thoughts may be either desultory or lively. The estimated duration of time will accordingly be very different in the two cases, since it depends upon the nature of the thought process rather than on external events. Usually, of course, the content of thought is conditioned by the perception of external situations, but the former is not necessarily determined by the latter. Waiting to be treated by the dentist may seem almost interminable, but during that time the mind is usually imaginatively engaged, and filled with more than the average number of thoughts. Had the waiting patient been able to expel all thought and make his mind a blank, time would have seemed surprizingly

[1] See, for instance, *The Psychology of Time*, Mary Sturt, London, 1925; and *Allgemeine sinnesphysiologie*, V. Kries, Leipzig. 1923.

short because of the absence of anything to mark its passage. Benussi[2] seems to be near the truth when he states that a time-interval appears long when the attention of the subject is drawn towards it, and short when attention is drawn away from it. Operatives sometimes give very little attention to their work and are constantly looking at the clock, with the result that time seems to pass with unusual slowness. When, on the other hand, difficult conditions absorb the attention, they are often surprised at the accelerated passage of time.

When an activity is accompanied by interest, attention is spontaneous and the conative process functions smoothly and continuously. The thought processes constitute parts of a unified whole and the individual is not consciously aware of the associated components. Time in consequence appears to pass comparatively quickly because of the uninterrupted flow of mental activity towards the desired goal.

In repetitive processes devoid of interest there seems to be an absence of any definite conation unless it is the longing for the signal which denotes the end of the industrial day. As a result the mind of the repetitive worker is often filled with a number of varied and discordant thoughts, and attention is constantly directed to the amount of time still to be worked. Time seems to be measured by the awareness or the number of thoughts passing through the mind within a given period, and as these are both numerous and disconnected, the day appears to be supercharged with ideas and its duration in consequence overestimated.

[2] V. Benussi, *Psychologie der Zeitauffassung*, Heidelberg, 1913, p. 456.

FACTORS IN WORK PRODUCING OR ALLEVIATING BOREDOM

Although the experience of boredom appears to be largely dependent upon personal characteristics and tendencies, it is also related to the type of occupational activity. A general comparison is frequently made between the days of craft-skill and modern repetitive tendencies. Formerly the bootmaker, for instance, was responsible for the production of the complete article. Often he was acquainted with the person who bought and wore the boots, and his interest in them was revived when they were brought to be repaired. He was supposed to take pride in the product of his skill, and the completion of each article was the satisfying outcome of his constructive effort. Nowadays the employee in a boot and shoe factory is usually concerned with the repeated production of a single part, and has no personal interest in the final product or its destination.

There is little doubt that the varying nature of the work, with its appeal to the constructive instinct and resulting pleasure in achievement, associated with the days of craft skill, were much less conducive to boredom than the repetitive processes of modern industry. The latter, however, sometimes contain elements which are unfavorable to the development of boredom. Thus operations involving attention and adjustment in response to varied situations are generally less boring than those which make only intermit-

tent and partial appeals to mental activity. In the former case the mind is actively and sometimes interestedly engaged; conative tendencies are constantly aroused in response to unexpected situations, and present obstacles to the intrusion of incompatible tendencies. In the latter the mind is frequently disturbed by elements in the industrial situation, but remains comparatively unoccupied during the intervening periods. At such times thought is free to dwell upon such distressing matters as the length of time still to be endured, and boredom is liable to supervene. Mind-wandering may, of course, provide a certain amount of relief, but the frequent interruptions make the process very discontinuous. Providing the mind can be actively engaged, whether in connection with the industrial process, or in activities entirely dissociated from the conditions of work, boredom is not likely to arise with any degree of intensity.

Another antidote to boredom is the mild excitement and interest created by attempting to keep pace with machines running at a fixed speed. Provided this tempo is suitably adapted to the natural rate of working of the operative, it frequently acts as an incentive to activity when the tendency of the operative is to relax, and the rhythmical movements promote a pleasant emotional effect.

The additional incentive and satisfaction which accompanies a piece-rate system of payment also tend to retard the onset of boredom. There is little doubt that when the rate of payment is based upon the amount produced, the operative is dimly aware that each unit of output has its equivalent in the amount received at the end of the week, and consequently the activities acquire a derived interest which is absent from a time-rate system of payment. As a result boredom tends to be more prevalent when the operatives are paid according to time worked and is diminished by the additional interest and satisfaction associated with a piece-rate system of payment. A somewhat similar view has been expressed by a German writer,[3] who stated that boredom is influenced by the system of wage-payment, and concluded that a time-rate was more conducive to boredom than a piece-rate.

The experience of boredom is also dependent to a certain extent upon the method by which material is supplied to the operatives. Quantities which take about an hour to complete give much more satisfaction than an endless flow along a conveyer, because of the interest and pleasure associated with consciousness of achievement. Anyone who has been confronted with the task of turning-over half-an-acre of ground will be familiar with the overwhelming nature of the outlook. If, however, he deludes himself that the area is really composed of smaller parts and sets himself to complete one of these instead of the larger whole, the disagreeable features shrink to small proportions, interest is revived, and work proceeds with a swing. A somewhat similar situation confronts the person who is condemned to memorize a long poem. Although certain psychological

[3] H. Sachs, "Das Monotonieproblem," *Zeits, f. ang. Psychol.*, Vol. XVI, 1920, p. 71.

considerations suggest the "whole" method of learning rather than the "part," there is little doubt that the latter is more interesting than the former because of the smaller magnitude of each successive task and the satisfaction arising from each sectional achievement. In industry also, the completion of each batch of supplies, whether it be three gross of tins to be sealed, two dozen handkerchiefs to be folded, or four dozen filaments to be wound, is regarded by the operative as a self-contained task within the larger whole. Instead of developing symptoms of an inferiority complex she feels she is well "on top" of the job, experiences satisfaction as each batch is approaching completion, and is pleasantly relieved when the end is actually attained. No such variations fall to the lot of the conveyer worker, who is carried along by the never ending stream of supplies.

The length of time during which a repetitive form of activity can be endured with a certain amount of satisfaction seems to have its root in the evolutionary process. As Bücher remarks,[4] "children and primitive people seldom persevere with an occupation, and they tire of it more or less quickly as it demands greater or less concentrated attention and continuous exertion. This is not because they are incapable of standing bodily fatigue, but that they are incapable of continuous mental effort which involves inhibition of other activities and consequently a special fatigue."

Although adult operatives differ from the type of individual specifically mentioned by Bücher, their desire for change in the form of activity, or for the division of work into a number of circumscribed tasks, is comparable to that of children or primitive peoples. In some operatives it is more intense than in others. Hence, whenever possible, it is advisable to break up the supply of industrial material into units which evoke a series of conative tendencies with their accompanying interest and satisfaction.

[4] Bücher, *Arbeit und Rhythmus*, Leipzig, 1896.

DIFFERENCES IN INTELLIGENCE, HABITS AND TEMPERAMENT

Apart from the effect of variations in the objective conditions of work, individual differences in response to similar situations are also instrumental in determining the degree of boredom experienced. Clearly an important problem for future research is the determination of the personal characteristics which make the worker peculiarly susceptible to boredom, to be followed by the construction and application of suitable diagnostic tests for guidance purposes. The path to be pursued has been faintly indicated by some of the results obtained in a recent enquiry.

In the first place, it has been shown that workers endowed with a comparatively high degree of general intelligence tend to be bored by repetitive conditions of work, while those with a much lower order of intelligence are generally more satisfied with uniformly repeated activity. If further research corroborates this view, an important advance will have been made.

Secondly, some individuals seemed to suffer from boredom because they

were unable to indulge with freedom in such remedial measures as mind-wandering or conversation, unless, at the same time, productive efficiency was appreciably impaired. Individual differences in ability to mechanize the task were appreciable, and those who are successful in this respect not only conserve energy by relegating performance to the lower levels of the nervous system, but are also in a better position to enjoy any personal or social amenities associated with the conditions of work. A man may swing his legs thousands of times in the course of a twenty mile walk, and conversation with a pleasant companion would not impair progress, but act as an antidote to boredom. If, however, he had to concentrate attention on every step, exhaustion would quickly supervene.

Thirdly, it is highly probable that the degree of boredom experienced by individuals employed on repetition work may be conditioned by temperamental tendencies. These tendencies, which appear to be inherited, are responsible for many varied forms of behavior, and determine whether a person shall be active or reflective, excitable or phlegmatic, stable or unstable. An individual who is temperamentally lively and mercurial will probably be unsuitable for repetitive work, while one who is patient and submissive may be better adapted to such conditions. Since temperamental tendencies are believed to be almost as deep-seated and persistent as the instincts, and to be intimately connected with occupational success,[5] their investigation appears to be one of the most important problems for future research.

[5] See, for instance, "Temperament and Social Status," by F. C. Bartlett, *Journal of the National Inst. of Industrial Psychology*, Vol. 3, No. 8, p. 401.

SUGGESTED REMEDIES

Rest Periods

Since the natural inclination of the bored industrial operative is to discontinue the unpleasant activity, rest would appear to be the most obvious remedy in such cases. This possibility has already received recognition in some industrial establishments, and the value of a pause as a means of alleviating the effects of boredom has also been the subject of special enquiry.[6] There is not the least doubt that a rest of ten minutes duration, introduced about the middle of the work-spell, tends to neutralize the unpleasant and unfavorable effects of repeated activity, and is capable of producing an increase in output varying from 2 to 10 per cent.

Equally efficacious in this respect is a change in the form of activity. Just as the apparently fatigued muscle may be induced to resume activity by changing the weight it lifts, so the impaired activity of the repetitive worker may be improved by changing the conditions of work.

In many industrial processes the workers have to return finished work and procure supplies and, providing the excursions involved in this procedure occur at suitable times, they are very effective in supplying the necessary change in position and

[6] Reports Nos. 25 and 32 of the Industrial Fatigue Research Board.

activity. Even more beneficial are the situations which provide a complete change in the form of activity about half-way through the spell of work. The results of numerous investigations have shown that a change of occupation every two hours or so throughout the day reduces boredom and has a beneficial effect on output. There are many industrial processes in which this procedure is possible, and the question has been fully discussed elsewhere.

Short Pauses for Conversation

In addition to these remedial measures, the results of the present enquiry show that workers often unwittingly resort to various devices for the purposes of neutralising the effects of boredom. Of these, perhaps the most noticeable is conversation with other operatives. This procedure is a natural and effective antidote to boredom, since it diverts attention from the unpleasant aspects of work and provides an interesting outlet for the expression of personal desires and inclinations. Talking is particularly prominent where the workers form a compact social group, and although it impairs the rate of working whenever attention is necessary to efficient performance, it is probable that output would be still further reduced if talking were prohibited and boredom in consequence allowed to reign supreme. In this connection it is interesting to speculate upon the possible effect of introducing a few short rests within the spell of work during which the workers could let off conversational "steam." By this means conversational tendencies might possibly coalesce, and talking to the accompaniment of work thereby reduced to a minimum. Since talking requires an audience, it follows that the isolated worker will usually be unable to indulge in conversation and consequently will be denied its ameliorating effects. As a result, one would expect to find boredom more pronounced in the case of isolated workers, and statements made by the operatives support this view.

Conditioning Day-dreams and Reveries

Another prominent tendency of repetitive workers is their indulgence in reveries or mind-wandering whenever opportunity permits. Day-dreaming appears to compensate for the deficiencies of life in general and industrial conditions in particular. The worker who is able to day-dream becomes oblivious to unpleasant realities and remains comparatively undisturbed by the unsatisfying features of repetitive work. She is able to exist happily in a world of her own creation, unless, of course, depressing moods determine the content of thought. Situations of the latter type, although probably in a minority, do occasionally exist, and are sometimes conditioned by grievances arising from the conditions of work. The grievance may initially be of minor significance, but uncontrolled rumination is often favorable to its growth, with the result that it eventually finds expression in serious industrial unrest. The creation of a healthy industrial atmosphere is particularly important in this respect. It not only prevents the development of undesirable thoughts, but often sterilizes them at their source.

The extent to which thought can be detached from work will depend upon the nature of the task and the characteristics of the individual. Obviously the more repetitive and uniform the process, the more automatically will it tend to be performed. When activities become habitual, the mind is free to pursue its own inclinations and the conditions are conducive to mind-wandering or phantasy formations. Simple and uniformly repeated operations are, however, by no means the only processes which may be performed with a minimum of attention. Driving a car in city traffic or even the performance of a Beethoven Sonata may, under certain advanced conditions of achievement, become almost habitual, and thought is left free to dwell on other things. Obviously a simple repetitive process will be more easily automatized than a more complex operation, consequently many industrial conditions appear to be particularly favorable to mind-wandering.

As a general rule, boredom seems to be experienced when the attention of the operative is not entirely required by the industrial task, and yet at the same time she is unable to detach her thoughts from the industrial situation. In this respect individuals differ considerably, for while some gifted persons are able to perform two or three operations simultaneously, others are disturbed whenever their thoughts are diverted to subjects having no connection with the work in hand. In short, the more the mind is occupied, whether it be in the process of production or in the more detached operation of mind-wandering, the less likely is boredom to be experienced.

It is generally believed that mind-wandering or day-dreaming is particularly prevalent in the introvert type of person, while the extrovert seldom or never falls into such a state. Further investigation may show that the experience of boredom may be rare in the introvert because of his tendency to seek refuge in day-dreams, while the extrovert, full of activity and interest in external situations, may find repetitive conditions unsatisfying and tedious.

Since, therefore, day-dreaming may be pleasant means of escape from the monotonous conditions of work, and in many cases satisfies personal cravings, it cannot be wholly condemned, but must be accepted as a frequent and possibly beneficial derivative of repetitive work.

At the same time, it must be remembered psycho-analytic enquiries have shown that reveries, like dreams, may contain unpleasant memories of past emotional experiences. Grievances, anxieties, worries, and fears are notoriously persistent, and emerge into consciousness whenever the 'censorship' is relaxed. Recurrent experiences of this type uncritically received sometimes assume grossly exaggerated proportions, and become the dominant determinant of behavior. The individual fails to distinguish between imagined and real situations, and in extreme cases the imagined plan may be carried into execution. There is, as yet, no evidence that the day-dreams of industrial operatives lead to such abnormal states.

Making the Work Interesting

All the remedial measures such as rest-pauses and changes in activity, together with alleviating tendencies

like talking and mind-wandering, would be practically unnecessary as a means of combating boredom if work were interesting. Interest is the greatest enemy to boredom, and although repetitive work can never possess the inherent interest of skilled craftsmanship, much might be done to improve industrial conditions in this respect.

In the first place, although the task may appear to be the monotonous repetition of simple movements, boredom need not be unduly pronounced if the operater feels that the work is worth while. Knowledge frequently creates and extends interest, and instruction regarding the preparation, production, distribution, and use of industrial commodities would create new and varied points of contact between the operator and her work. Thought would be promoted along wholesome lines and much of the stagnancy of 'unfilled time' thereby removed.

Improving the Industrial Atmosphere

Since boredom is conditioned not only by the type of industrial process, but also by the entire industrial atmosphere, it is important that the latter should be beyond reproach. In regiments, universities, schools, and similar institutions, traditions and standards of achievement are set up and feelings of pride engendered among the various members. A definite attitude of mind or sentiment is created in connection with the institution, which makes individual members very consciously aware of their position in relation to the organization. The behavior of the individual is largely determined by the nature of the prevailing sentiment or group consciousness; and habits of action and thought are inculcated which conform to the traditions of the institution and meet with the approval of the community.

In certain factories and workshops a similar group consciousness exists which is capable of further development. In a particular mill in the cotton industry, for instance, the operatives are proud of the reputation enjoyed by the firm, and endeavor to preserve it by turning out work of exceptional quality. To work for this firm has become the desire of all the operatives in its locality, with the result that the firm is staffed with contented and enthusiastic workers.

This desirable sentiment can be fostered and developed by promoting and extending the social life of the operatives. Games are particularly useful in this connection, and the formation of football or hockey teams which take part in inter-works competitions develops the consciousness of belonging to a particular firm. Thus Smith's operatives become more distinctly Smith's when opposed to the workers of another firm, and to play and work for Smith's becomes an integral part of their conscious life. A thoughtful and humane employer can be most instrumental in promoting this sentiment, for the interest he takes in the work, play, and general welfare of his operatives will be reciprocated, and a harmonious and well-knit community will be the result. There is no reason why the attitude of operatives towards a firm should be very different from that of the members of public schools, universities, and regiments toward their respective in-

stitutions. Loyal and enthusiastic operatives, surrounded by a sympathetic and friendly atmosphere, will experience a satisfaction which reduces boredom to comparative insignificance.

SOCIETY'S RESPONSIBILITIES TO THE REPETITIVE WORKER

Unless operatives are able to find facilities for development outside the factory, it seems probable that long and repeated exposure to monotonous conditions of work will have a dulling effect on mentality, and lead to the formation of habits which may impair their value as members of the community. It is undoubtedly largely true that workers who for years have been employed on simple repetitive operations, have no desire to change, and dislike being transferred to any process requiring judgment and thought. How far this attitude is the result of long exposure to monotonous conditions it is difficult to say, but it is probable that in the early stages of their industrial life they were eager to progress, but the absence of stimulation in the industrial environment has left them increasingly inert, and content to exist in the narrow groove of daily routine. Although in many individuals the natural tendency is to behave in accordance with the lines of least resistance, repetitive work seems to accentuate this tendency, instead of stimulating thought and action along original paths. It is probable, therefore, that the unfavorable effects of repetitive work are not confined to the industrial environment, but extend to activities outside the factory and have a detrimental influence on thought and behavior in general. The provision of attractive educational and cultural facilities is accordingly of the utmost importance, if the repetitive worker is to take her place as a harmoniously developed and worthy citizen.

(*Manuscript received October 10, 1928*)

Measuring Susceptibility to Monotony

By Lorin A. Thompson, Jr.,[1] *Ohio Wesleyan University*

Monotony, with its baleful tendencies to pessimistic revery and obsessions, may not after all prove to be the bête noire of repetitive industry; for monotony is a function of the individual worker even more than of the particular job. Some day the highly repetitive work of the factories will be done by those who are by temperament and disposition especially fitted for it.
Dr. Thompson has analyzed afresh the nature of monotony, and developed new experimental techniques for measuring the differences between people in their susceptibility to uniformity of work.

This study is an experimental approach to the increasingly important question of how to measure or to predict susceptibility to monotony. The first part is a review of the literature with a critical statement of the problem; the second reports an experimental attack on the subject.

The method of approach consisted of having the subjects do four different types of work, each divided into a uniform phase and a varied phase. Records of both production and errors were kept for each phase of the work. The records were finally expressed in terms of decrement for each phase of each kind of work. This was done by dividing production for the first half of the work period by the corresponding figure for the second half. The per cent decrement for the varied phase was then subtracted from the per cent decrement for the uniform phase. This gave a single score which expressed the relative susceptibility to monotony of the subject for each type of work. A similar treatment was given the error record.

Other data were gathered from personal history blanks and rating scales which were filled out by each subject. Each individual was then rated independently by two trained raters. These data when combined yielded information which was weighted and combined into a criterion of susceptibility to monotony. It was found that a battery of four out of the twelve tests when optimally weighted gave a correlation of .71 with the criterion.

Susceptibility to monotony is but little influenced by intelligence status.

[1] From the Psychological Laboratory of Ohio State University. The author wishes to express his appreciation to Dr. H. E. Burtt under whose direction this study was made.

MODERN industry with its tendency toward extreme specialization has brought many new psychological problems which in times past were unknown. Some of these problems may be viewed as by-products of a complex civilization, but others are of fundamental importance both to industry and to society. The days of the cobbler are past, and cobbling is practically a lost art. In the place of skilled workmen have come machines which have changed very materially the old industrial régime. This trend in industry has developed many specialized routine types of work which require only an ordinary amount of skill and can be learned within a relatively short time. From these conditions two important problems of interest to the psychologist have developed: first, fatigue; second, monotony.

MONOTONY AND FATIGUE

In distinguishing between the two problems, C. S. Myers (17) says,

> "We have come to distinguish between two main problems of activity,—the one (fatigue) involving the consumption of substance intracellularly laid down for outbursts of relatively intense, spasmodic activity, the other (adaptation) of whose nature we are wholly ignorant, demanding a special direction and resulting in an enduring set of the organism. The outcome of the former we may regard broadly as 'act,' the outcome of the latter as 'attitude.' Both must involve work and the expenditure and degradation of energy, but we may regard the 'act' as characteristic rather of mechanism and resulting preëminently in the degradation of energy, while the 'attitude' is characteristic rather of life, and is directed toward the elevation of energy. . . . . So long, for example, as the affect of interest is present the attitude of attention readily continues unaltered. As interest wanes, monotony enters. . . . . A favorable attitude thus goes with a favorable affect. The right 'set' being seemingly associated, therefore, with the activity especially of the autonomic nervous system."

WHAT IS SUSCEPTIBILITY TO MONOTONY?

We may then characterize susceptibility to monotony as an attitude. It involves the attitude and disposition of the workman more than the type of work. Münsterberg in speaking of monotony remarks that there is no possibility of telling objectively whether a job is monotonous or not. For example, he found a woman packing light bulbs who had been going through the same motions day in and day out for over twelve years. She reported that she enjoyed her work very much. In all probability this job would soon tire many workers and would result in their search for other work. Münsterberg describes monotony in terms of unpleasant feeling that the task arouses in the individual. Its characteristics are boredom and disgust.

More recently Robinson and Bills suggest that work decrement is due to the fact that a limited number of muscle groups are used,—that is, the more diverse the material and the greater the variety, the less the decrement. For any type or work there is a direct correlate of the recency and frequency with which that activity has been practised. In one of their letter-naming experiments, when the factor of competition was introduced, it tended to disturb the

simple relationship between the degree of complexity of the work and the slope of the decrement curve.

These findings, contrary to the conclusions of the authors, seem rather to lend additional support to the contentions of Münsterberg and Myers that monotony is quite different from fatigue. They further suggest that monotony may best be determined in terms of individual susceptibility, which in Myers' sense, is a matter of attitude. Susceptibility to monotony may then be characterized as an individual difference which in some cases assists the individual in adaptation, and in others, interferes with adaptation. It is also highly probable that these "sets" are learned and tend to be specific rather than general.

HISTORY OF THE PROBLEM

Early Results of Münsterberg

Münsterberg (16) was the first to attack the problem experimentally. He presented lists of words verbally to different groups. In each list, either half of the words, or one more or one less, belonged to the same conceptual group, *e.g.*, flowers, birds, etc. The remaining words in the list were without any inner connection and were mixed in with the others in random order. The subjects were required to state whether the similar words were more or less numerous than the dissimilar words. The results were compared with a questionnaire dealing with certain daily habits which might reveal a liking for uniformity or variety.

Subsequently he used digits rather than words. He again found that similar impressions tend to inhibit each other, that is, (1) a digit occurring twice in a series of digits presented serially is often seen but once; and (2) digits quickly succeeding each other in a series have a tendency to fuse or inhibit each other. This tendency is found unequally developed in different persons. In summarizing, Münsterberg lays down three principles: "(1) individuals differ in degree in susceptibility to uniformity or monotony; (2) those individuals are most susceptible to monotony or uniformity who least recognize similarity and repetition; (3) those individuals are least susceptible to monotony who best recognize repetition and uniformity."

Dunford's Experiment

In 1924 at Ohio State University Dunford repeated Münsterberg's experiment. In general his procedure was very similar to Münsterberg's,—his conclusions, however, were contrary. Dunford found, for example, that there is a relationship between perception of similarity and subjective dislike of uniformity. The differences in results are due to different methods of analyzing their results. Münsterberg's analysis was simple and perfunctory. Dunford was a little more careful in both analysis and treatment of his data.

In view of the seeming unsatisfactoriness of this method, Dunford ventured on another approach. His method was to measure the individual differences in susceptibility by means of production records. His general plan was to divide a given type of work into two phases,—a uniform phase and a varied phase. His

method was to plot individual production curves for each type of work. From these a third curve was constructed. The percentages of deviation were plotted as ordinates, and the order of the intervals or trials as abscissae. This gave a measure of susceptibility to uniformity which was converted into a score. The correlation between his questionnaire and the scores indicating susceptibiliy to monotony was found to be .67 ± .11. This method of approach was found in later work to be quite useful.

English Studies of Monotony

The English work is of unusual interest because many of the investigations were conducted in factories rather than in laboratories. Wyatt's (24) first investigation was with clerks filling orders for a wholesale drug company. Each item in a given order was assembled by the clerk filling the order. At the time Wyatt began his study filling from 6 to 12 orders a day was the average individual accomplishment. Wyatt's first change in procedure was the assigning to each worker of a single task to perform during the day. Under this system production decreased. These conditions represent extremes. The first condition is one of excessive distraction, and the second is one of great uniformity.

In another study Wyatt had three subjects working at three types of activity over a period of six weeks. The three types of work were, first, simple addition; second, mechanical computation; and third, a form of muscular work (pulling a string balance every half minute). When the subjects worked at all three tasks during the day they did from twenty to twenty-four per cent more work during the day than on those days on which they did the same task throughout the day. A difference was also found in the length of the work periods which were varied between thirty and fifty minutes. For these particular activities the fifty minute spell was slightly better.

Burnett (2) and Wyatt (24) in other studies suggest a relationship between susceptibility to monotony and intelligence. In both these studies, however, susceptibility to monotony was presumably indicated by a decrease in production or the level of efficiency on the job. Burnett used four subjects of different degrees of intelligence to do cross-stitching on a piece of wide meshed canvas. The experiment set out first to study the difference in output as revealed by differences in intelligence; second, the effects of various lengths of work periods and the effects of rest pauses on their output; and, third, to discover the optimal length of work period for this type of work. Of the four subjects, A and B were very intelligent, C was of average intelligence, while D was of low intelligence. The four girls were all seventeen years of age.

The subjects worked six hours daily in two spells of three hours, four days a week under four different conditions. The four conditions were: 1. (Tuesday) the workers paused whenever inclined to,—the rest pauses were unorganized; 2. (Wednesday) 15 minute rest pauses in the middle of the morning and afternoon spells; 3. (Thursday) the girls worked at maxi-

mum speed for the entire morning with no rest pauses and no talking was allowed; 4. (Friday) there were three rest pauses during the morning and afternoon spells distributed at even intervals. During the experiment the subjects were paid higher wages than usual in order to be sure that they would continue throughout the experiment. The results of the experiment may be summarized as follows:

SUBJECT	INTELLIGENCE RANK	OUTPUT RANK	OUTPUT INDEX
A	1	2	88
B	2	3	84
C	3	1	100
D	4	4	69

The production of C was taken as 100 and the others were compared with this base. Of the four subjects D's progress is most unstable. C's progress showed the least variability. A and B were capable of high production but could not maintain it, as they became noticeably bored after a time.

The average daily production record showed Thursday to be the highest. This was given an index of 100; Friday was next, index 94; Wednesday third, index 93; Tuesday 4, index 90. While the production records were greatest on Thursday, under which conditions no talking was allowed, the workers were usually disgruntled and out of sorts while working.

Wyatt (25) in a more recent study investigated the relationship between intelligence and monotony from another angle. In this experiment there were thirty subjects, all girls. The study was made in a soap factory where the girls were engaged in wrapping tablets of soap. Each process took 40 seconds and was repeated about 720 times daily. In an analysis of the activities several short tests were used to predict relative efficiency of the workers. The tests used and the correlation of the tests with efficiency on the job were as follows:

Efficiency on job with	r
Intelligence	.25 ± .114
Knotting	.03 ± .13
Match Insertion	.03 ± .13
Tapping	.18 ± .13
Touch Discrimination	.21 ± .13
Job Duplicate	.22 ± .13

The manual tests were repeated in three months in order to determine their reliability. A final test was also designed to duplicate the job itself. It consisted in having the workers wrap 50 tablets of soap. The reliabilities of the tests were: knotting test, .57; match insertion test, .35; tapping test, .68,—too low to yield very satisfactory predictions of efficiency on the job. Wyatt further found that variability of the workers could not be used as a satisfactory index of susceptibility to monotony.

Kornhauser (13) found in a survey of office workers that labor turnover was greatest among the most intelligent who were working at low grade jobs. The more intelligent workers could more readily secure better jobs. They also were easily bored and became disgusted if their work was not sufficiently difficult or varied.

In a recent study Wyatt and Fraser (27) have presented additional data on the comparative effects of uniformity and variety in work. Three kinds of work were studied: soap

wrapping, handkerchief folding, and bicycle chain assembling. Each kind of work was executed under conditions of uniformity and of variety.

Measures of output were taken as the criterion of comparison. In the soap wrapping experiment the average hourly output was slightly higher for each operative under conditions of uniformity than under the varied conditions. The production increase being from .5 to 6.2 per cent higher under the uniform condition. Wyatt, commenting on the degree of variation in production under the two conditions says,

> "In three cases (workers A, B, and D) the rate of working under the varied method of procedure was significantly steadier than under the uniform conditions; in another two cases (workers C and E) the differences although steadier were not significant, while in the case of worker F the deviations from the average were slightly less when the work was uniform and continuous throughout the day. On the whole, therefore, in this group of workers, the more uniform rate of working appears to be associated with variety in the method of production."

A similar series of observations of operatives folding handkerchiefs under uniform and varied conditions revealed but slight differences in production under each situation. In the third part of the experiment in which the work records of four operatives were studied, the increase in production of the workers under the varied process was from 2.4 to 5 per cent. A study of the output curves shows that if the operatives were employed at a different task during the first half of the work spell, the subsequent decrease in efficiency during the second half was less.

In passing it seems that there are evidences of definite individual differences in susceptibility to uniform and varied activity in each part of the experiment. This suggests that variations in production under uniform and varied conditions are probably due more to differences in degree of susceptibility to uniformity than to the repetitive or varied nature of the work itself.

In the second part of this investigation, three experiments are reported in which the purpose was to determine (1) the optimum duration for one form of activity before changing to another, and (2) the most suitable type of work for the alternating processes. The three types of work selected were: tobacco weighing, cigarette making, and assembling cartridge cases.

In the cigarette making experiment a number of operatives complained of boredom under the conditions of uniformity. Output was uniformly better under conditions of variety. In the tobacco weighing experiment individual differences in daily output varied from 5 to 25 per cent. In this experiment production was slightly higher when the form of activity was changed twice per spell.

To account for the production decrement under conditions of uniformity the hypothesis is advanced that the fatigue is more local than general. Many repetitive operations require the use of the large skeletal muscles which are not easily fatigued, yet the condition of boredom develops noticeably more in some workers than in others. As has already been suggested in the present paper there is a difference between fatigue and monot-

ony, and probably we shall understand monotony better if we emphasize the importance of individual differences to it as well as emphasizing the differences in kinds of work.

Wyatt's conclusions concerning the nature of light repetitive work are

(1) Uniformity in the method of procedure is generally less productive and conducive to greater irregularities in the rate of working than are varied forms of work;
(2) The highest output is obtained when the form of activity is changed after 1½ or 2 hours of unvaried work;
(3) Many changes are detrimental to output because of their interference with the swing of work.

In addition there is a certain amount of evidence to show that

(4) In repetitive work of a fatiguing nature, changes in the form of activity should be relatively more frequent;
(5) A high degree of resemblance between the alternating forms of activity, although subjectively satisfying, is not conducive to increased output.

In "Boredom in Industry," Wyatt gives a more generalized statement of the problem of boredom than is to be found in reports of his experimental studies (28). Here he presents an analysis of the psychological problems related to monotony, suggesting various ways to combat it. The present writer believes with Wyatt that there is another promising approach to the problem: the possibility of discovering and allocating people who like repetitive work and who dislike varied work. This problem is related to the more fundamental one of temperament and disposition, which has much to do in determining whether an individual prefers routine to change.

CRITIQUE OF METHODS

Previous investigations of the problem of susceptibility to monotony have been suggestive of technique, but none as yet has developed either a satisfactory criterion of susceptibility or a group of satisfactory tests. The approaches of Wyatt, Burnett and other British investigators have been somewhat unsatisfactory because of their failure to define the problem accurately. In all of their investigations there is a confusion between efficiency on the job and freedom from susceptibility to monotony. Their studies, however, do suggest that while degree of intelligence is not the most important factor in determining susceptibility, emotional stability plays a rather important rôle.

Münsterberg's early work made the best approach toward defining the problem of susceptibility to uniformity, but his technique in the light of present day statistical considerations is very meager. It must be remembered, however, that Münsterberg called attention to the problem and succeeded in pointing out its nature.

Dunford's technique was a decided improvement in that he devised a new means of measuring this capacity.

Following the lead of Dunford, the procedure in the present study was to compare an individual's performance at the same general type of work under two situations,—namely, a situation of uniformity and one of variety. Four types of work were selected,

each of which was divided into two phases, a uniform phase and a varied phase. A punch board, paper and pencil maze drawing, number cancellation, and a crank apparatus were used in the experiment. Upon analyzing the data it was found that the ratio of production in the first half of a work period to that in the second half afforded a rather sensitive measure of decrement for each half. That is to say, if production during the first half of the work spell were larger than the production for the second half, the quotient would be greater than unity. Similarly, if production were greater for the second half than for the first half, the ratio would be less than unity. Production ratios for both the uniform and the varied phases of any task could then be subtracted from each other and a single score obtained which represented whether or not the individual were susceptible to uniformity in that particular kind of work. These scores could then be compared with the criterion.

MEASURE OF SUSCEPTIBILITY USED

Both Münsterberg and Dunford used questionnaires dealing with one's attitude toward various daily habits which might seem to reflect one's preference for a uniform or a varied type of existence. In the present study a similar though longer list arranged in the form of a graphic rating scale was used. In the original list there were 47 items. This was submitted to a group of twelve judges who were instructed to rate the items from uniformity to variety, or from variety to uniformity as the case might be, and to exclude any that in their judgment were not properly scaled or were ambiguous.

From these data the following weighting scheme was adopted. Those items on which 10, 11, or 12, of the judges agreed on the scaling were given twice the value of the others, that is, the value originally assigned such items on the graphic rating scale was multiplied by 2. Those items on which 7, 8, or 9 of the judges agreed but which were regarded as ambiguous by the remaining judges were given the regular value (from 1 to 10) on the graphic rating scale. All items in which the judges disagreed were rejected. The position taken regarding this matter of accepting or rejecting an item is in brief as follows: an item which 9 of the judges scale in one way and two of the others reverse the scaling is a less valid item than one about which there is a definite agreement among those who do not regard the item as ambiguous.

In addition to weighting the items in the scale they were so arranged as to avoid any possible "halo" effect (11, 12). Following are some typical items in the scale:

1. How often have you moved of your own accord?

Several times yearly	each year or so	few times	never

2. At the present time do you get up at the same hour each morning during the school year?

No, different time each day	yes, when necessary	always

3. When you read or study where do you sit ordinarily?

Same chair in same place	change occasionally	prefer to change often

In order to make the rating scale a little more accurate, additional ratings

were secured from men who had known each person to be rated from one to three years. The reliability of self ratings and the test material was then determined by the method of self correlation,—that is, correlating the odd numbered items against the even numbered. The coefficients of correlation thus obtained were then corrected with the Spearman-Brown Prophecy formula. These appear in table 1.

TABLE 1

Correlations of graphic scale items

	SENIOR X	SENIOR Y	SELF-RATINGS
Senior X.....	.79	.32	.23
Senior Y.....		.44	.01
Self-ratings.....			.45

From table 1 one notices that the senior ratings do not correlate very highly with one another, nor do they correlate to any large degree with the self-ratings. The most probable interpretation of this is that each rating is probably a measurement of a different phase of the individuals' susceptibility to uniformity. These ratings were then weighted and combined according to the squares of their respective reliabilities. Thus an individuals' single total score for susceptibility to monotony could be obtained by multiplying his score obtained on X by 3, and adding in his score on Y and the self-rating. It is estimated that this yields a criterion with a statistical reliability of approximately .9.

OTHER FACTORS IN SUSCEPTIBILITY TO MONOTONY

To shed further light on the whole problem, additional data of a different sort were collected. A rather comprehensive emotional history was arranged in the form of a graphic rating scale. There were 91 items in the list. Many of the items were similar to the Emotional History Record of Watson and Chassell (5) except for the revision in the form of a graphic rating scale. This is called Form I. Following are sample items from the scale.

1. Do you sleep poorly?

Never	Seldom	Occasionally	Usually	Most of the time

2. Do you worry too much about little things?

No	Occasionally	Much of the time

29. Are you ever troubled with dreams of people being dead or about robbers?

Never	Once in a while	Often

The items were scrambled in chance order and inverted so as to avoid possible "halo" effects.

Form II was a continuation of the personal history record. Samples of typical questions from Form II are:

Have any of your near relatives been insane, epileptic, or feeble minded?..... Yes....No....
Was your home characterized by marked demonstativeness?... Yes....No....
Did older persons attempt to determine your career?..... Yes....No....

These items were answered either "yes" or "no." The subject was instructed to encircle "yes" if the answer described him or to encircle "no" if that were the better answer. In scoring, the items were tabulated separately and the frequency of "yes" and "no" replies was totaled for each

item. The items were in turn weighted according to their uniqueness (7).

The questions in Form II were similar to those used in the Woodworth-Wells psychoneurotic inventory. There were 70 items in the scale.

Form III was a modification of Freyd's (8) introvert-extrovert scale. The items were arranged in the form of a multiple choice test. The subject was instructed to place in a space provided at the right hand side of the page the number of the phrase which most accurately described him.

Finally the percentile score made by each subject on the Ohio State University Intelligence Test, was secured.

ADDITIONAL TECHNIQUE

In addition to the rating scores, emotional history records, and intelligence test scores, several pieces of apparatus were designed further to investigate the problem. The kinds of work selected had to be of such a nature that they could easily be divided into a very simple uniform phase and a more complex varied phase. The general assumption being that if a person is susceptible to monotony, this suceptibility will manifest itself most easily and quickly by comparing the error and production records of each subject's performance at the uniform and varied phase of the same general type of work. The four types of work selected in the present experiment which permitted of this easy division were (1) work at a simple punch board, (2) work at a simple crank, (3) work at paper and pencil mazes, and (4) work at number cancellation.

The Punch

The Punch apparatus was a simple device consisting of two brass plates 6 inches x 6 inches mounted upon a wooden board 7 inches x 10 inches x 1 inch. The bottom plate was three-eights of an inch from the top one and parallel to it. In it were punched 25 holes $\frac{1}{2}$ inch in diameter, 1 inch apart from center to center, and arranged in a square pattern. The plates were insulated from each other by fibre posts at the corners. A binding post was attached to each plate. The stylus used for making contact with either plate was a brass rod $\frac{3}{16}$ inch in diameter sunk into a wooden handle $\frac{3}{4}$ inch in diameter at each end but hollowed out to fit the hand conveniently. A flexible wire led from the punch to the anode.

When the stylus touched the bottom plate a circuit was closed through an electric counter which recorded the number of contacts. If the stylus touched the top plate a circuit was made through a buzzer and a second counter.

The Punch was placed on a flat top table at an angle of 15 degrees from the plane of the table. The subject was seated upon a high stool when he was working at the apparatus. There was an arm rest on the table which elevated the arm 3 inches from the table adjustible to the comfort of the subject. As the subject was working he was instructed to hold the wire leading from the stylus in his left hand in order not to interfere with the task. He then received his instructions and was allowed to practice for one minute after which he was told to begin. Production was recorded no one

counter and errors on the other. The buzzer warned him of his mistakes.

The counters used were small Veeder counters operated by 6 volt electromagnets. When the circuit was closed an extension of the armature threw the counter lever. A spring took the lever back to the initial position the instant the circuit was broken. The counters operated efficiently at a speed considerably greater than that required. These were placed on the experimenter's table which was behind the subject. The position and arrangement of the apparatus was such that the experimenter could watch the subject.

The simple task consisted of making an X pattern on the apparatus by placing the stylus successively in the holes of the two longest diagonal paths. The actual pattern was 1, 7, 13, 19, 25; 5, 9, 13, 17, 21; 1, 7, 13, 19, 25; etc.[2] The subject began at the upper left hand corner, traveled to the lower right hand corner, thence to the upper right hand corner, and descended to the lower left hand corner, and then repeated the operation throughout the first work period.

The varied task consisted of making a more elaborate pattern in the same fashion as for the simple phase of the experiment. The pattern followed was: 5, 9, 13, 17, 21; 10, 14, 18, 22, 1; 15, 19, 23, 6, 2; 20, 24, 11, 7, 3; 25, 16, 12, 8, 4; 5, 9, 13, 17, 21; etc.

The subject worked at this task for a period of ten minutes following his instruction and his practice period of one minute under the supervision of the experimenter.

[2] The holes were not numbered, but to clarify the description, No. 1 was the hole in the upper left hand corner; No. 5 was in the upper right hand corner; No. 6 was below No. 1, etc.

The Crank

The Crank apparatus consisted of a cylinder 4 inches long and $3\frac{1}{4}$ inches in diameter enclosed in a box provided with a crank which made contact at various places on the exterior surface of the cylinder. At intervals of 1 inch on the exterior surface of the cylinder were two pairs of contact screws. All four screws were in the same straight line. Those screws of a pair were as close together as possible without being contiguous. These were raised above the surface of the cylinder $\frac{1}{8}$ inch. The inside screws of each pair were connected to the same binding post. This made it possible to record production from the contacts which the subject made during his task. The outside screws were connected in a similar manner and led to a second binding post. Contact with the outer screws was recorded as an error. Through the center of the cylinder was an axis rod $\frac{1}{32}$ inch in diameter. Encircling the external surface at the middle was a groove $\frac{3}{8}$ inch wide which was used as a starting point for the subject operating the apparatus.

The axis rod of the cylinder extended to the outside on the left side of the box. Attached to the end of the axis was a knob which was used to rotate the cylinder which permitted the different sets of contacts to be exposed. The left end of the cylinder had a large circular collar which was $2\frac{3}{4}$ inches in outside diameter and $2\frac{1}{4}$ inches in inside diameter. This collar

was connected to all of the inside contact screws and served as a terminal for them. It made a continuous contact with a copper brush on the inside of the box in which the cylinder is inserted. The brush in turn was connected to a binding post on the outside of the box. The axis rod served as a terminal for the outside contact screws. The axis rod also made continuous contact with a spring wire which was fitted tightly against it when the cylinder was inserted in the box. The spring was connected to a third binding post.

Encasing the cylinder was a small wooden box 6 inches x $4\frac{3}{8}$ inches x $4\frac{5}{8}$ inches. One side was open to permit the cylinder to be inserted and removed easily. In the ends of the box were two slots $\frac{3}{8}$ inches wide extending horizontally to the center of the ends. The line of the right groove was $\frac{1}{4}$ inch higher than the slot at the left end but was hollowed $\frac{1}{4}$ inch at its terminus which permitted the axis to be level and firm when in use.

The spring wire was connected to a binding post on the left end of the box. The groove on the left end did not have the additional socket in the wood. On the top of the box was a counter sunk aperture $\frac{1}{4}$ inch wide and $4\frac{1}{4}$ inches long. This enabled the subject to see the pairs of contracts with which he was working. On the under side of the top was a $\frac{1}{4}$-inch rack and a 10 tooth pinion. The rack had a brass extension which was visible through the aperture; on its other end was a small crank whose drop lever was 1 inch long. The metal covering of the pinion served as an electrode which was connected to a binding post on the outside.

The pairs of outside contacts were connected in series with a buzzer and counter which recorded each contact made with the indicator. These were considered as errors. The pairs of inside contacts were connected with another counter which recorded the contact with the indicator which was regarded as production. The subject turned the crank which moved the indicator in a horizontal plane visible through the aperture as it glided back and forth between the contact points of the cylinder. The apparatus was fastened firmly to a table. This made it possible for the subject to work seated on the stool as he did at the Punch.

In the simple phase of the experiment the subject turned the crank back and forth between the longest pair of inside contacts. In the complex series the subject turned the crank from the center groove to the inside contact to the left, thence to the inside contact to the right then back to the center. With the left hand he then turned the knob at the left end of the box forward until the next pair of contacts came into view, and then proceeded similarly for the remainder of the work period.

While at work the subject was told to seat himself comfortably at the apparatus. He was given his instructions, and after a practice period of one minute proceeded with the task.

Cancellation

The uniform phase of the number cancellation task consisted in having the subjects go through lists of

numbers and cancel all of the 8's. There were 51 numbers in each line and 20 lines to the page. The subject was given several sheets so that he could not finish before the work period was completed. Each worked at this for ten minutes. The number of 8's cancelled and the number of errors and omissions were recorded for each half of the work period. The varied phase consisted in having the subject go through the same list of numbers and cross out 5's and encircle 3's until he came to 7, when he was to encircle 5's and cross out 3's until he came to 7, then reverse the process again, etc.

Mazes

The pencil mazes were patterns worked out on a typewriter. The uniform pattern was a cross with each sheet containing six patterns, all alike. The letters on the patterns were C's and X's. The subject was given instructions quite similar to those of the number cancellation and was told to begin with A and trace the shortest path of X's to Z, being careful not to cross out a C, to cut corners nor travel diagonally. If he made a mistake he was instructed not to retrace his path, but to continue. Incorrect excursions were scored as errors.

The complex pattern consisted of six more difficult patterns, each different. There were six mazes on each sheet. When working at either phase the subject was given sufficient number of sheets to provide for the work period.

The method of scoring the mazes was to count the total number of corners completed. This was called the production score. Any false excursion was counted as an error. Both production and error scores were kept for each half of both phases of this part of the experiment.

The different types of work described were done under standard laboratory conditions. Each subject reported on two different occasions, once during the fall quarter and once during the winter quarter. The net amount of testing time required for each of the subjects was 40 minutes on each occasion.

A ten minute work period was selected on the basis of some preliminary experimentation. A five minute rest period was used between successive work periods to obviate the possibility of fatigue and transfer effects. The plan and distribution throughout the experiment was for the subject to work at the uniform phase of the Punch, rest five minutes, then work for ten minutes at the simple mazes, rest five minutes, work at the varied Punch pattern, rest and then work at the complex mazes.

HOW THE DATA WERE HANDLED

After a careful inspection of the data, the method finally used as an indication of the degree of susceptibility of the subject was to divide his production record for the first half of the ten minute work period by his production record for the second half of the work period. This ratio yields what might be called a Production Decrement ratio for each phase of each kind of work. If the Production Decrement ratio of the varied phase is subtracted from the corresponding ratio of the uniform phase, a single

score is obtained which expresses the degree of susceptibility to uniformity of the subject for that particular kind of work. If the subject's score were minus, it presumably indicates a lack of susceptibility to monotony; if the score is plus, it presumably indicates susceptibility. Treating the data in this manner commends itself in that (1) the scores are not influenced in any way by the rate at which the subject works; (2) the score expresses the relative efficiency of each subject to uniform and varied phases of the same general type of work; and (3) the final score is not only easily obtained, but is accurate and easily interpreted.

TABLE 2

Summary of data for intercorrelations

SUBJECT	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
1	1289	27	142	313	49	18.5	9.39	13.8	10.9	.46	.46	2.0	.64
2	1285	100	160	230	14	21.5	9.52	12.2	9.3	.50	.41	2.08	.49
3	1453	55	162	316	7	13.8	10.03	10.2	12.3	.59	.61	2.03	.57
4	1735	50	152	309	32	17.4	10.66	13.1	14.4	.35	.30	2.19	.78
5	1637	97	155	331	85	18.0	9.79	10.6	12.2	.37	.60	2.29	.33
6	1651	76	157	292	7	18.1	7.0	15.7	7.5	.56	.32	2.05	.28
7	1244	81	148	355	92	18.0	10.39	12.6	8.6	.78	.63	2.15	.54
8	1643	46	147	322	56	21.7	8.0	8.2	14.3	.45	.40	1.74	.10
9	1534	66	175	306	21	10.1	10.00	9.7	12.2	.38	.47	2.00	.58
10	1098	62	179	348	86	24.4	2.28	3.3	7.9	.65	.43	2.79	.96
11	1536	77	150	294	15	9.3	8.82	12.1	11.7	.46	.91	1.60	.47
12	1466	61	155	280	39	12.2	10.33	11.0	8.7	.55	.65	1.86	.55
13	1681	18	156	249	26	16.2	2.25	16.2	10.0	.38	.62	1.74	.54
14	1640	75	151	275	22	8.4	11.25	15.7	13.3	.48	.60	1.55	.78
15	1586	17	151	289	39	16.1	12.0	13.9	11.6	.80	.75	2.25	.58
16	1699	63	162	272	24	1.5	2.54	15.7	10.7	.46	.50	2.19	.64
17	1601	9	153	272	60	20.8	3.9	12.75	9.5	.62	.70	2.10	.64
18	1698	78	151	280	25	15.5	12.0	8.5	7.2	.59	1.06	1.86	.60
19	1601	98	167	329	38	28.3	8.48	12.5	10.0	.56	.56	2.02	.56
20	1563	78	158	243	18	8.35	9.9	10.0	10.1	.57	1.02	2.16	.58
21	1663	32	154	267	44	12.0	10.0	15.0	8.0	.51	.49	.62	.45
22	1679	98	142	336	46	14.2	9.8	15.8	9.7	.46	.67	2.34	.13
23	1703	71	152	270	35	16.0	12.32	9.5	10.7	.22	.56	2.46	.52
24	1654	100	147	226	10	18.1	7.9	12.8	8.5	.50	.68	2.20	.38
25	1705	93	145	235	15	11.3	5.3	13.0	8.0	.40	.50	2.25	.43
26	1916	83	164	261	51	15.0	12.2	9.0	11.2	.51	.54	1.97	.47
27	1321	1	171	351	30	17.6	7.4	13.0	12.25	.49	.43	2.13	.60
28	1841	39	173	308	37	30.6	4.3	11.0	9.0	.44	.46	1.97	.48
29	1614	87	143	290	25	15.6	19.8	3.4	10.2	.53	.47	1.84	.44
30	1595	89	166	381	45	17.9	9.75	7.6	15.47	.50	.45	2.24	.61
31	1452	17	166	375	25	16.4	7.13	8.4	10.4	.44	.50	2.46	.42
32	1598	94	148	307	66	14.1	10.00	18.0	10.5	.45	.59	2.57	.90
33	1899	81	158	258	65	14.5	8.78	11.0	8.9	.48	.38	2.55	.38

The error scores were handled similarly. However, in order to have an error score which is not influenced

by the rate at which the subject works, the errors must be reduced to percentages for each half of each work period. Furthermore, since the errors have been reduced to a percentage basis, instead of dividing the error record of the first half by the error record of the second half, the percentage of errors of the second half of the work period were subtracted from the percentage of errors of the first half. These scores are called Percentage Decrement scores. The Percentage Decrement scores of the varied phase were then subtracted algebraically from the corresponding score of the uniform phase. This score was then comparable to the Production score, but the interpretation is reversed, *i.e.*, a plus score indicates a lack of susceptibility, whereas a minus score presumably indicates susceptibility.

The complete scores of all the data are found in table 2. The final score of each subject for each type of work and for each questionnaire appears in table 2. In the first unnumbered column are the numbers of the subjects (1–33). In the second column under I, are the weighted criterion scores (Susceptibility to Monotony)[3] of each subject. Under II are the percentile scores of the Ohio State University Psychological Test. Under III are the scores on the introvert-extrovert scale. Under IV are the scores on the emotional history records and V, scores on the personal history blanks. Under VI, VII, VIII, and IX are the Error Decrement Scores for the Punch, Crank, Mazes and Cancellations. To simplify the treatment of these data a constant was added to each score to obviate the necessity of handling 0 scores. Considerable confusion results in tabulating a scale from −.15 to .15 in the proper allocation of a 0 score. This procedure does not alter the distribution, but shifts the origin. The constant added in every case was just larger than the greatest minus score. Under X, XI, XII, and XIII are the "P" or Production Decrement Scores as described on page 185 for the Punch, Crank, Mazes and Cancellation respectively. Constants similar in nature to those used in variables VI to IX were likewise used to eliminate the 0 and negative scores.

The successive rows of table 2 present the modified results for each of the subjects on each of the 13 variables. The numbers of the variables appear at the top of each column.

Using the data in table 2 each test was correlated with the criterion (Susceptibility to Monotony) and with every other test. Table 3 contains the r values of the intercorrelations as found by the Pearson product-moment method. These coefficients indicate the validity of each test as well as the degree of overlapping with the other tests. Furthermore, from them the partial correlations and the regression equation were computed so that the tests might be combined optimally.

INTERPRETATION OF TABLE 3

To interpret table 3 it will be remembered that a low score on 1, indicates susceptibility to monotony, and that a high score indicates lack of susceptibility. A low percentile score in 2 indicates a relatively low degree of

[3] See Measurement of Susceptibility to Monotony as described on page 185.

intelligence as compared with college freshmen. Thus a correlation of +.21 between intelligence and susceptibility to monotony indicates that there is a slight inverse relationship between the degree of intelligence and the degree of susceptibility to uniformity. This will be further elaborated after the presentation of the partial correlations. A correlation of −.13 suggests that there is a very slight tendency for the extrovert to be more susceptible than the introvert, for a low score on III indicates a tendency toward introversion and a high score indicates a tendency toward extroversion.

The relationship between 4 and 1 is very suggestive. A high score in 4 indicates relative instability whereas a low score indicates relative stability. A coefficient of −.46 indicates a rather definite tendency for the more unstable person to be much more susceptible to monotony than the more stable person and vice versa. The personal history blank suggests the same thing although much less emphatically. From the intercorrelation between 4 and 5 there is a considerable amount of overlapping. In considering the next four coefficients one would suspect *a priori* that a low

TABLE 3

Coefficients of correlation

	1	2	3	4	5	6	7	8	9	10	11	12	13
1		.21	−.131	−.457	−.207	−.148	.154	.182	.06	−.456	.004	−.15	−.386
2			−.17	−.17	−.01	−.12	.16	−.08	−.15	−.06	−.12	.18	−.16
3				.28	.05	.26	−.37	−.34	.06	−.02	−.29	.19	.29
4					.42	.29	−.11	−.30	.44	.10	−.21	.23	.07
5						.35	−.08	−.17	−.18	−.29	−.14	.33	.12
6							−.18	−.23	−.18	.14	−.28	.19	−.07
7								.08	−.33	−.08	.29	−.25	−.03
8									−.06	−.08	.01	−.20	−.03
9										−.33	−.18	−.06	.12
10											.27	.01	.15
11												−.08	.06
12													.17

Legend of variables

1. Form IV (average)
2. Intelligence Percentile
3. Form I
4. Form II
5. Introvert-extrovert Scale
6. Error Decrement Punch—*E*
7. Error Decrement Crank
8. Error Decrement Mazes
9. Error Decrement Cancellation
10. Production Decrement Punch—*P*
11. Production Decrement Crank
12. Production Decrement Mazes
13. Production Decrement Cancellation

score would mean susceptibility while a high score would indicate a lack of it. It is to be remembered that these are error decrements. The fact that the coefficients between 1 and 6, 7, 8, and 9 are all low precludes the possibility of using them to predict susceptibility to uniformity. There is a faint suggestion, however, that the same person will differ in his susceptibility to different sorts of work. This fact is much more marked in the next four variables, viz., the *P* values of the four types of work. It will be remembered that for the *P* values a high score indicates susceptibility and a low one a lack of susceptibility to uniformity. The production decrements for both the punch and cancellation tests indicate a marked relationship between the size of the decrement ratio and susceptibility as measured by the criterion. There is on the other hand, only a slight relationship betwen 1 and 12. The relationship between 1 and 11 suggests that it is unsatisfactory as a predictive measure. Inspection of the last four coefficients indicates that the subjects were somewhat more susceptible to monotony in terms of the Cancellation Tests than of the Mazes, and in turn were more susceptible to monotony on the Punch than any of the other types of work.

The relative amount of overlapping between the variables can readily be obtained from a more detailed study of the table of intercorrelations. The exact amount and the extent to which each test overlaps with every other test can be easily observed in the following manner: Suppose we select test 5 for example. Descending the column labelled 5 we discover that 5 correlates with 1 to the extent of −.207, with 2 to the extent of −.01, with 3 to the extent of .05, with 4 to the extent of .42. Then by following the next horizontal row across we find that 5 correlates with 6 to the extent of .35, with 7 to the extent of −.08, etc.

Those intercorrelations which are most interesting are those between the variables which were selected by the multiple ratio procedure (cf. p. 190). It will be noted that the correlations between 2 (Intelligence) and 4 (Emotional History Record) is −.17 which indicates slight negative relationship, between 2 and 10 (Punch Production decrement score) −.06, which suggest that those two variables are relatively independent of each other. 2 and 13 (Cancellation Production decrement score) show again a slight inverse relationship. The correlations between 4 and 10, and 4 and 13 are low and indicate but a very slight amount of overlapping. The coefficients of correlation are .10 and .07 respectively. Since 10 correlates to the extent of .15 with 13 this again shows a very small amount of overlapping. In certain of the other intercorrelations there is a high degree of overlapping, *e.g.*, between 4 (Emotional History) and 5 (Personal History) which correlate to the extent of .42. This suggests that emotional instability as measured by 4 is correlated to the extent of .42 with unique personal history. In addition the correlations between 3 and 7, 3 and 6, together with 3 and 11, 3 and 12, and 3 and 13 are interesting. In the introvert-extrovert scale 3, the higher score indicates extroversion and the lower score indicates a tendency toward

introversion. The error decrement differences of E values (cf. p. 185) which are largest suggest *a priori* a lack of susceptibility while the lower suggests a tendency toward susceptibility. But 6 and 7 do not correlate appreciably with the criterion so that the *a priori* assumption in this case does not seem warranted. If the error (E) decrement differences are at all suggestive, it is quite evident that the differences are not uniform for all types of work. The correlation between 3 and 6 suggests that the extrovert has the largest decrement difference ($r = .29$) while in 7 it has the smallest E value as the correlation between 3 and 7 is $-.37$. The same interpretation can be made between 3 and 11 (Production decrement crank P value) and 3 and 13 (Cancellation production decrement P value) except that here it will be remembered that a higher decrement ratio difference or P value indicates susceptibility, and a low one a lack of susceptibility. This suggests that the susceptibilities tend to be specific rather than general,—otherwise one cannot account for a positive correlation for one type of work and a negative one for another type of work.

The next step in the procedure was properly to weight and combine those tests that would give the maximum prediction of the criterion.

The tests were combined and weighted according to the method outlined by Toops in his Multiple Correlation ratio chart (21, 22). Toops' Multiple Ratio is a technique of correlation by which the several best tests predicting a criterion can be selected from a larger group of tests without having to resort to the more tedious partial correlation method. The general procedure is to select first the test that correlates highest with the criterion and assign it a value or weight of 1.

The second test to be placed in combination is then determined by the formula

$$\beta \frac{U}{C} = \frac{r_{IU} - r_{IC} \times r_{UC}}{r_{IC} - r_{IU} \times r_{UC}}$$

where

β = a true multiple weight (in this case 1).
C = combination of 2 tests at beginning of process.
U = unique test or factor to be added.
X = criterion.

The third test is placed in combination at a weight given by the following formula

$$\beta = \sqrt{\Sigma W_y^2 + 2 \Sigma r_{xy} \times W_x W_y \cdot \frac{r_{IC} - r_{IC'} - r_{UC'}}{r_{IC'} - r_{IU'} \cdot r_{UC}}}$$

W = weight of β
y = any variable that has been added
r_{xy} = intercorrelations of the added variables
W_x = weight of one added variable
W_y = weight of another added variable
X = criterion
C = combination of 1 test existing at beginning of process
C' = desired combination (to be obtained by adding a factor to C)
U = unique test or factor to be added
r_{IC} = correlation of the criterion with existing combination (one test at the beginning)

$r_{IC'}$ = correlation of criterion with desired combination
r_{IU} = correlation of criterion and the unique factor
r_{UC} = correlation of unique test or factor to be added to the existing combination.

Additional tests are added in the same manner until there is no appreciable gain in the correlation between the criterion and the combination of tests. The generalized formula using the above notation is

$$r_{IC} = \sqrt{r_{IC}^2 + r_{IU}^2 - 2\frac{r_{IC} \cdot r_{IU} r_{UC}}{1 - r_{UC}^2}}$$

The Multiple Ratio Correlation indicated that the four variables which would best predict the criterion when combined according to their optimal weights were 4, 10, 13, and 2; viz., Emotional Stability, Production Decrement Ratios of Punch and Cancellation, and Intelligence. This revealed that those four tests when optimally combined would give a correlation of .71 and that in addition, a combination of other additional tests would not appreciably increase the prediction of the criterion.

In the interest of further simplicity, we shall now refer to Variable 4 as 2; 10 as 3; 13 as 4; and 2 as 5. This will simplify matters later in referring to the tests when treated with the partial correlation technique. The weights of the selected tests will then be designated respectively as subscripts 2, 3, 4, and 5. The values are given in table 4.

From the weights when the standard deviations are known, the regression equation for the gross scores may be written according to the following formula:

TABLE 4
Weights assigned selected tests

TESTS	WEIGHT
2	1.
3	.998
4	.783
5	.0074

$$X_c = \frac{\beta_1}{\sigma_1} X_1 + \frac{\beta_2}{\sigma_2} X_2 + \ldots\ldots \frac{\beta_n}{\sigma_n} + K$$

Where:

X = the most probable score on the criterion as predicted from the tests.
β_1 = weight value of first test selected
β_2 = weight value of second test selected
σ_1 = σ of first test selected
σ_2 = σ of second test selected
(Subscripts apply to the added test)
K = constant.

TABLE 5
Sigma values

σ_1	= 74.00
σ_2	= 3.74
σ_3	= .1135
σ_4	= .1765
σ_5	= 25.55

The regression equation for the preceding tests would be

$$X_1 = \frac{\beta_2}{\sigma_2} X_2 + \frac{\beta_3}{\sigma_3} X_3 + \frac{\beta_4}{\sigma_4} + \frac{\beta_5}{\sigma_5} + K$$

Where X_1 = criterion and subscripts 2, 3, 4, 5 refer to added tests.

The β values are given on the preceding page and in table 4.

The σ values are given in table 5.

Substituting, the regression equation becomes

$$X_c = \frac{1}{3.74}X_2 + \frac{.9998}{.1135}X_3 + \frac{.783}{.1765}X_4 + \frac{.0074}{25.55}X_5$$

$$X_c = .27\,X_2 + 8.808\,X_3 + .444\,X_4 + .029\,X_5$$

which gives the most probable score on the criterion of any person on the basis of the tests weighted optimally.

The four tests selected by the previous method were next treated with the partial correlation technique to analyze out the intrinsic relationship existing between the various tests and the criterion, *i.e.*, the relationship between emotional stability and susceptibility to uniformity independent of intelligence, and performance in the other two tests. There were four partial correlations of the third order computed to determine the exact amount of relationship between each variable and the criterion. These correlations were computed according to the standard procedure described in Yule (29).

For computing the partial coefficients of the first order the formula is

$$r_{12.3} = \frac{r_{12} - r_{13}\,r_{23}}{\sqrt{1 - r_{13}^2}\,\sqrt{1 - r_{23}^2}}$$

where

r_{12} = relationship between 1 and 2 with 3 constant
r_{12}, r_{13}, r_{23} = coefficients of zero order

The values for the partial coefficients of the second order are computed from those of the first order, and of third order from those of the second order according to the following equation:

where

$r = r_{12.34\ldots n}$ = relationship between 1 and 2 with $34\ldots.n$ constant
$r_{12.3}; r_{13.2}$; etc. coefficients of the first order
$r_{12.34}; r_{13.42}$; etc. coefficients of the second order
$r_{12.34\ldots}(n-1)$; etc. coefficients of the $(n-1)$ order.

The values for the partial coefficients of the first order are computed from those of the second order, those of the second order from those of the first order, etc. The values of the partial coefficients of the third order are found in table 6. These four factors combined according to the multiple ratio method yielded a coefficient of .71 with the criterion. It is possible to check this method by the following formula using the partials:

TABLE 6
Values of partial r's of third order

$r_{12.345}$	$= -.47$ (Emotional history)
$r_{13.245}$	$= -.45$ (Production decrement: Punch)
$r_{14.235}$	$= -.37$ (Production decrement: Crank)
$r_{15.234}$	$= .11$ (Intelligence)

$$1 - R^2 = (1 - r^2_{12})\,(1 - r^2_{13.2})\,(1 - r^2_{14.23})\,(1 - r^2_{15.234})$$

where R = the multiple coefficient contained by combining the tests optimally and correlating the weights score with the criterion.

r_{12} = coefficient of the zero order
$r_{13.2}$ = coefficient of the first order
$r_{14.23}$ = coefficient of the second order
$r_{15.234}$ = coefficient of the third order

$$r_{12.34\ldots.n} = \frac{r_{12.34\ldots(n-1)} - r_{1n.34\ldots.(n-1)} \cdot r_{2n.34.\ldots(n-1)}}{\sqrt{1 - r^2_{1n.34\ldots(n-1)}}\,\sqrt{1 - r^2_{2n.34\ldots.(n-1)}}}$$

Substituting the $1 - r^2$ values in the equation we have

$$.4959 = .78 \times .78 \times .84 \times .98 = .50$$

which is a close approximation. As a final check on all computations the original data in table 2 weighted according to the regression equation were correlated with the criterion. The coefficient of correlation was found to be .71. This checks all of the other computations. We can now observe more carefully the intrinsic relation between the variables.

The factors which contribute most heavily to susceptibility to monotony are emotional instability, and production decrement ratio of the punch apparatus. They are practically of equal importance. Likewise the production decrement ratio for the cancellation test indicates a marked relationship in the same general direction, viz., that those subjects who were most effected by the uniform work were those who were most susceptible to monotony on the criterion. The last result is rather interesting in that it shows that the problem of susceptibility to uniformity is not so much a matter of intelligence, but rather of emotional attitude.

This conclusion would seem to contradict the results of the previous findings of Wyatt and of Münsterberg particularly. Münsterberg's notion was that those people who are most susceptible to monotony were those who had the greatest difficulty in discovering that the job was of a routine nature. It is difficult to state whether Münsterberg had the factor of intelligence or some other factor such as attitude in mind. If he had intelligence in mind it is obvious that it plays but a minor rôle while the emotional attitude of the person does play a very important rôle in enabling us to predict whether or not he is susceptible to uniformity. On the other hand if Münsterberg meant an emotional "set" or attitude or disposition then his general notion is quite in keeping with the present findings. Wyatt working in industry used as his criterion efficiency on the job which, as has been pointed out previously, is not a satisfactory criterion for the variable he was trying to isolate.

It is also of interest and importance to emphasize what the data suggest that is, if a factor such as performance is to be selected as a predictive measure, some expression of the relative performance of the individual on the uniform and the varied task is needed with careful evaluation of the various types of work to be used in the testing procedure.

The group used in the experiment were all college students to a certain extent, intelligence range was limited. Of the group, however, the intelligence percentile in table 2 reveal that the subjects are distributed widely through the university range. Subjects 2 and 24 are 100 percentile students in the intelligence distribution while subjects 17 and 27 are 9 and 1 percentiles respectively.

The standard deviation approaches very closely to that of the University distribution. This group would hardly approximate the sort of group one might expect to find in an employment office.

All of the tests used in the final

multiple correlation can be said to have a relatively high validity. This is easily demonstrated according to a formula suggested by Kelley (10)

$$r_{tc} = \sqrt{r_{Cc}} \times \sqrt{r_{Tt}} \qquad (1)$$

where

r_{tc} = maximum possible correlation between the criterion and the test
r_{Cc} = the reliability of the criterion
r_{Tt} = the reliability of the test

Inverting the formula it becomes very easy to approximate the minimum possible reliabilities of the tests finally selected. For example, the criterion is composed of 3 heterogeneous factors having reliabilities of .80, .45, and .46 respectively. These were weighted according to the ratios of their squares. The reliability of the criterion would be increased above .8 by the addition of new factors properly weighted. The approximate reliability would then be, using Brown's formula .90 or above as r_{Cc}. If the correlation between test and criterion is .47, then solving the above formula (1) for the reliability of the test:

$$.47 = \sqrt{.90}\sqrt{r_{Tt}}; \sqrt{r_{Tt}} = \sqrt{\frac{.47}{.97}} = \sqrt{.484} = .69 \qquad (2)$$

r_{Tt} = .69 as the minimum reliability for the Emotional History Record, and the Production Decrement Difference on the Punch. The reliability for the Production Decrement Difference and Cancellation is at least .635.

SUMMARY

This study has approached the problem of susceptibility to uniformity in a new way which promises to throw considerable light on the general problem. Susceptibility to monotony has been defined as an attitude or "act" distinct from either intelligence or special capacity. An attitude, as defined, is a group of conditioned visceral habits which are capable of modifying the person's behavior regardless of the degree of intelligence or capacity. It is quite apparent that attitudes play a very important rôle in determining whether a person is satisfied in any given situation and contribute in a large measure to all of the problems involved in adjustment.

The factor of susceptibility to monotony was isolated in the present study by means of carefully selected rating scales in which personal information regarding each subject was confidentially secured. These data were further verified by independent ratings made of each subject by carefully selected and trained raters. The composite ratings from the three sources were weighted according to their reliability and combined into the criterion.

The experimental approach consisted in having the subject work at each of the four types of work for two ten minute work periods. These work periods represented the uniform and varied phases of each type of work. Each work period was again subdivided into two halves. Records of production and errors were then recorded for each half of each work period. By dividing the first half of

the work period by the second half, the production decrement ratios were obtained for each phase of each type of work. Subtracting the decrement ratios of the varied phase from those of the uniform phase gave the production decrement differences. A similar procedure was followed for the errors except the percentage of errors of the second half of each phase was subtracted from the percentage of errors of the first half. These differences were then subtracted algebraically to give the error decrement differences.

Each production and error decrement difference was then correlated with (1) the criterion; (2) the percentile scores of the Ohio State University Intelligence Test; (3) an Emotional History record; (4) a personal history blank; (5) a modified introvert-extrovert scale; and each one with every other one.

From the table of intercorrelations it was possible to select, weight, and combine these factors giving the maximum prediction of the criterion. The factors selected were (1) Emotional History record, (2) Production decrement difference, for the Punch, (3) production-decrement-difference for Cancellation, and (4) Intelligence. In selecting the above tests additional variables were added until the addition of further tests failed to increase the prediction of the criterion. These when optimally weighted and combined gave a correlation of .71 with the criterion. The next step was to compute the coefficients of partial correlation to determine analytically the intrinsic relationship between the selected factors and the criterion. This procedure revealed which ones were the most important contributors to susceptibility to monotony. The order of importance is the same as the above mentioned order.

Incidentally time estimates were used in the experiment as a further technique. The method of treating the data was essentially the same as that for treating the other data. This part of the experiment showed the unreliability of time estimates as indications of susceptibility to uniformity.

CONCLUSIONS

Monotony is an attitude or "set" which noticeably affects one's adjustment to certain types of work. Monotony or uniformity, is *not* an attribute of any type of work *per se*; it is a conditioned habit system in the individual which to a large degree controls the direction of behavior modification that is possible in that individual.

This study suggests a novel and seemingly valid method of measuring susceptibility to uniformity of work.

From a set of 12 tests, a battery of 4 were finally selected which when optimally weighted and combined gave a correlation of .71 with the criterion (susceptibility to uniformity).

The present study also directs attention to the fact that it is possible to use such instruments as emotional and personal history records to approach problems that have not yielded to other technique.

Estimates of time are unreliable indices of susceptibility to uniformity.

There is evidence that subjects differ to some extent in their susceptibility to uniformity in certain particular types of work. Whether this is a

general or specific factor is a problem worthy of further research.

The most important single factor in predicting susceptibility to uniformity was emotional instability as defined in Form I, which gave a correlation of −.46 with the criterion.

Production decrement difference scores were also found about equally effective in predicting the criterion. The decrement ratio for production on the Punch gave a correlation of −.46 with the criterion, and the similar ratio for production on a cancellation test gave a correlation of −.39 with the criterion.

Contrary to all expectations, intelligence was found to play but a minor rôle in determining susceptibility. In general it may be stated that susceptibility to monotony is little influenced by intelligence status.

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Measuring Labor Turnover

A Report of Progress

By William A. Berridge, *Metropolitan Life Insurance Company*

The social and economic wastes entailed in excessive hiring and firing are being steadily reduced as management gains insight into the complexities of the situation. Measurement, as Dr. Berridge reminds us, is pre-requisite to accurate understanding. Whether ones' concern is with behavior of electrons, size of spiral nebulae, or fluctuations of the labor market, he needs some scale of units, a suitably calibrated measuring stick, by means of which to make quantitative comparisons. Such standards, for use in measuring five significant aspects of a company's labor turnover, are found in the indexes here described.

The nation's business is indebted to Dr. Berridge and to the Metropolitan Life Insurance Company for having developed these measures and made them available monthly during the past four years; and to the Secretary of Labor and Commissioner Stewart, Chief of the U. S. Bureau of Labor Statistics, for having undertaken to carry forward this service.

A continuation of two earlier reports on the labor turnover problem is herein presented as a résumé of a project in measurement experimentally undertaken in 1926 by the Metropolitan Life Insurance Company. Indexes of labor turnover in 350 companies over a period of ten years are given in tabular and graphic forms. Labor turnover is not considered as a homogeneous entity capable of expression as a formula but, rather, as composed of its several significant elements: voluntary separations, discharges, layoffs, and accessions. Assigned definitions were not given these components of turnover, but the data available under these headings assembled by the coöperating companies were used. Comparability of data progressively improved as employers receiving the service in increasing numbers became aware of the value of the indexes. The median was used as the measure of central tendency of the rates. In the past five years the average accession rate for the 350 companies is 4 per cent. The voluntary quit rate is 2.5 per cent; that is, voluntary quits constitute about three fourths of all separations; while discharges and layoffs contribute ½ of one per cent each to the 3½ per cent total separation rate. The use of the index curves as a barometer of economic conditions is suggested: the lower levels and narrower ranges of the variables since 1924 seem to indicate the stabilization of prosperity reflected in other economic indexes.

On two earlier occasions,[1] in 1925 and in 1927, the writer submitted to readers in this JOURNAL certain observations on the labor turnover problem. Special attention was given to measurement, on the ground that this seems an essential pre-requisite to scientific handling of labor turnover, as of problems generally—in management and in economics as in the physical sciences. Two specific projects of labor turnover measurement were discussed: one inaugurated in May 1925 by the Business Research Bureau of Brown University, the other in January 1926 by the Policyholders' Service Bureau of the Metropolitan Life Insurance Company. Both were concerned with factory labor turnover indexes constructed by the present writer—who, while no longer a member of either Bureau, has been asked by the Editor to bring this series of technical descriptions down to date.

This is an opportune moment for recapitulating the Metropolitan's project, since it has recently completed the experimental stage and has thereupon been transferred (as of July 1, 1929) to the United States Bureau of Labor Statistics. It may be said in passing, however, that the Company will continue its experimental work in other portions of the labor turnover and related fields, carrying on the contact work and the applications of the research to personnel management, through its Policyholders' Service Bureau as heretofore.[2]

Without question, our observation has shown that in recent years factory managers in large numbers are coming to realize more clearly than ever before the importance of labor turnover as a managerial problem—one which is usually not only wasteful and expensive, but also in large part controllable. The increase of interest in this problem, as in most others during the history of management, has many roots, rather then a single one. Among those most important in the present case are the following:

1. The principles and practice of business budgeting, which now has a strong hold in the fields of finance, sales, and production, and in conjunction with these is beginning to be thought out in terms of labor budgeting also.

2. Enhanced interest in functional organization, which is bringing about a concentrated study of all functions relating labor control as one of the important specialized functions of management.

3. An improved spirit in industrial relations, which is leading many employers to make the most sincere and whole-hearted efforts for conserving employee good-will, but nevertheless is failing to keep turnover from periodically increasing.

4. The high level at which wage rates have been virtually stabilized during the past few years—thereby enhancing the financial loss involved through the departure of trained workmen.

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[1] JOURNAL OF PERSONNEL RESEARCH, Vol. 4, 166–172; and PERSONNEL JOURNAL, Vol. 6, 1–14.

[2] Mr. Lloyd R. Miller of the Policyholders' Service Bureau has largely handled both of those functions in connection with the project herein described, the present writer's function being merely a technical one relative to the statistical and economic questions involved.

5. Recent disclosures of new evidence on the extent and fluctuation of labor turnover, so marshaled as to permit striking comparisons to be made between a company's internal experience and the more general experience of others, and to suggest the need for executive action.

COÖPERATING COMPANIES AND AGENCIES

The indexes hereinafter described currently represent data from about 350 manufacturers, with work forces aggregating about 600,000 on the average. Toward the early part of the period 1919–1929, the representation is of course smaller, being dependent upon the availability of back records; but for none of the variables used have we sponsored a composite without careful scrutiny and test.

Only about 100 companies have lately been reporting to the Metropolitan directly. The other 250 report to various local agencies which have from time to time indicated a desire to coöperate in this manner, and which have received from us (by permission of the companies concerned) such records as we had assembled at the time from manufacturers located in their respective areas. These agencies also collect data from other manufacturers than the 250, but we have refrained from incorporating them all indiscriminately into the national indexes, in order to avoid undue weighting of certain localities or certain industries. Perhaps three times as many manufacturers are reporting on labor turnover experience each month to some office or other as are incorporated in the 350-company indexes.

The coöperating agencies return to each of their reporting companies, each month, a sheet on which are given the particular company's turnover rates (as defined below) and the corresponding set of average rates for the entire area;[3] the sheet also carries the Metropolitan's national averages in a third column. The Metropolitan too has done this since the inauguration of the project, except that it has never considered it practicable to subdivide its national sample into a whole set of local groups; the number of companies would hardly have been adequate.

The number of such coöperating agencies has grown until, on July 1, 1929, it amounted to thirteen:

Associated Industries of Massachusetts
Brooklyn Chamber of Commerce
Brown University
Connecticut Industrial Council
Employer's Association of New Haven
Illinois Industrial Commission
Indiana University
Manufacturers' Association of the City of Bridgeport
Manufacturers' Association of Meriden
Ohio State University
Rutgers University
University of Denver
University of Michigan

THE PROBLEM OF FORMULA

Some readers may regard it as rank heresy for anyone to maintain that there is no one formula, or one best formula, for "*the* labor turnover;" yet such our view has been—and is.

[3] Some agencies are also showing a set of average rates for particular industrial groups within their areas.

We have recognized, of course, that a multiplicity of such formulas exists. The commonest among them is perhaps the ratio of total separations to mean number on payroll, that ratio being converted by multiplier to an equivalent annual basis. Some authorities have proposed the replacement rate; and diverse other proposals are on record in the voluminous literature on labor turnover.

Virtually the only point upon which we have insisted is that students of the labor turnover problem should resort to the first principles of *a priori* logic and of empirical statistical testing, in the light of which we have believed they would accept these theses: (1) that the total separation rate, despite its admitted usefulness, is not a homogeneous but a highly heterogeneous phenomenon; (2) that to be rendered intelligible it has to be resolved into its several constituents—voluntary quitting rate, discharge rate, and layoff rate; (3) that these three single constituents, (and the accession rate also) have value, each in its own right; and finally (4) that these may serve not only as measures of labor turnover experience *per se*, but also as useful, significant reflectors of economic or general labor market conditions when thrown into statistically suitable form.

We have been asking our reporting manufacturers simply to send in the following items each month, indicating whether they cover a four-week, five-week, or calendar-month period; it was found impracticable to call for the replacement item, desirable though that would have been:

1. Total Hirings (including re-hirings)
2. Total Separations
   (a) Voluntary Quits (excluding those involved in any labor disputes)
   (b) Discharges
   (c) Layoffs
3. Number on payroll (usually the average of the number at beginning and at end of month).
4. Remarks on any special situation affecting the Company's figures for the report period.

We have adhered to number on payroll in preference to number at work as the denominator for all rates—not only because easier to obtain but also because we deem it an intrinsically better measure of exposure, in general.

MUST TERMS BE RIGIDLY DEFINED?

Perhaps quite as heretical as our rejection of the one-formula idea is another view to which we have come: that a pre-arranged set of completely leak-proof definitions of voluntary quits, discharges, etc., to which all reporting companies must conform, is not vital. If it had been expedient to get such a set fairly widely adopted in advance, it would have been desirable; but it certainly was not expedient, and, fortunately, it did not prove necessary. All of the turnover variables concerned fluctuate so widely over a period of time that even a rather rough comparability of practice as to definition was sufficient to bring out striking conclusions as to the behavior of general turnover experience of manufacturers from first-approximation indexes, in relation to certain economic indexes derived from other sources. And the establishment of these conclusions, coupled with the increasing desire of employers to make the most precise comparisons possible between the general curves and the correspond-

ing data for their respective plants, obviously set up incentives which tended to bring about progressively greater comparability in the definitions employed by the reporting manufacturers.

To have brought about as much comparability as this in advance, without the advantage of such incentives, would have been almost hopeless, if one may judge from the outcome of endeavors of that sort previously made elsewhere. However, we wish to point out that the unanimity as to definitions is still not complete. The United States Bureau of Labor Statistics will doubtless succeed in making further advances to that end.

FORM OF AVERAGE USED IN RATE COMBINING

After considerable experimenting, the form of average which we adopted was the unweighted median of all the quit-rates, of all the layoff rates, etc.[4] The median, it will be recalled, is the central item of an array whose items have been arranged in order of magnitude. Thus, to take an extremely simple case, the five items, 1.3, 4.5, 0.2, 15.7, and 1.9, are seen (when they are arranged according to magnitude, 15.7, 4.5, 1.9, 1.3, and 0.2) to have 1.9 as their median.

The employment of the median in this type of personnel analysis is not usual, and requires justification. There are two main reasons for its use here. One is the ease with which it is determined. The other and more important reason is that the median seems to provide the soundest central tendency from which to measure deviations of an individual company's experience, since it largely avoids the danger of overweighting any extremly *large* (*or small*) *company* present in the group, and also that of overweighting the extremely *high* (*or low*) *rate* experienced by a reporting company. Detailed evidence on these points need not be recited here, as it is already on record elsewhere.[5]

The unweighted median tends to avoid both of these dangers, since (1) it is drawn from the array of the *rates* experienced by the individual companies irrespective of size of the company, and (2) it is determined by the mere *position* of the central rate, and is therefore independent of the actual size of those exceptional rates lying at or near the outer extremes. Extensive tests have shown that the unweighted arithmetic mean, for example, would have been very sensitive to extreme items, especially to extremely *high* rates—and of these there are many, for we find considerable "upward dispersion." For quit rates, the arithmetic average was found to exceed the median quit rate, in general, by one-third to one-fifth the size of the latter, during a test period of nearly eight years.[6]

Consideration of these facts has led us to the adoption of the median in preference to other measures of central tendency, for studying the general course of time series repre-

[4] For the total separation rate, the sum of the three component medians was used.

[5] This Journal, volume VI, page 6 *et seq.*

[6] This Journal, volume VI, pages 7–9, text and figures 2 and 3.

senting the several constituents of labor turnover.

COURSE OF INDEXES

During the past five years, the accession rate has averaged about 4 per cent per month, the total separation rate 3½ per cent, the layoff and the discharge rates ½ of 1 per cent each, and the voluntary quit rate 2½ per cent, or about three-fourths of all separations. Of course the variables have fluctuated considerably above and below their respective averages for these five years, and in the preceding five (1919–1923) fluctuated over a still wider range.

Four of the variables yielded by this study—accessions, layoffs, voluntary quit, and discharge rates—are presented graphically for the entire period back to January 1919, by months, in figure 1 and figure 2. These four, and the total separation rate also, are shown in tabular form at the end of this article. In both places, the rates are shown on the basis of the "standard month;" in other words, the variations in lengths of the several calendar months and of company report periods are all eliminated, so that the point plotted for any month whatever is exactly one-twelfth of the "equivalent annual rate" prevailing in that month. It should be noted (at the left and right of the figures) that each of the four variables is charted on a statistical scale different from each of the others, in order to disclose more clearly the fluctuations and course of the discharge and the layoff rates, which, of course, would have been less easy to read if charted on the same scale as accessions or even voluntary quits.

Let us consider first the significance of the data in figure 1. On account of the tremendous boom of 1919–1920, the accession rate (full line) was high, reaching and even exceeding 16 per cent per month at some points in the period. For a similar reason, the layoff rate (dotted line) fell rapidly to the vanishing point, and remained low until the last few months of 1920. In 1921, business depression caused accessions to fall to 2 or 3 per cent per month; layoff rates correspondingly rose, averaging about 2 per cent per month during 1921 as a whole, and reaching twice that figure in one month of the year. Since then, each of the curves has responded to the cycle of economic and industrial conditions in much the same general manner as it had before—but each within a much narrower range from high to low.

Of the second pair of variables, the voluntary quit rate (full line) mounted very high (to 10 per cent per month and more) in 1920, partly because workers found it easy to better themselves by resigning to take other jobs, which were very plentiful, and partly because (with high accession rates—compare figure 1) work forces were becoming diluted with large numbers of short-service employees, who of course have a characteristically poor persistency. Other factors also had some influence, but these two were the most important.

Conversely, quits fell sharply in the 1921 depression, to an average of about 2 per cent per month. Discharges (dotted line) showed nearly the same general behavior as voluntary quits,

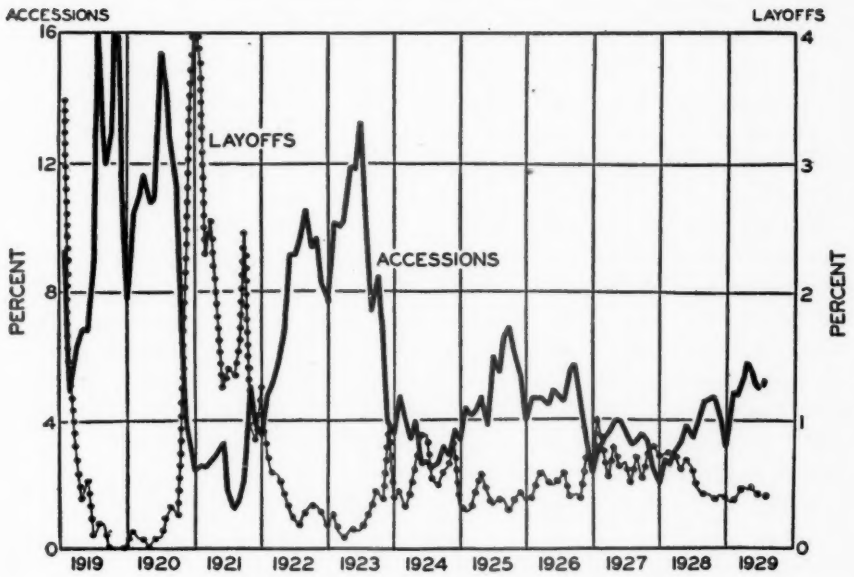

FIG. 1. ACCESSION AND LAYOFF RATES IN FACTORIES
Adjusted to Standard Month

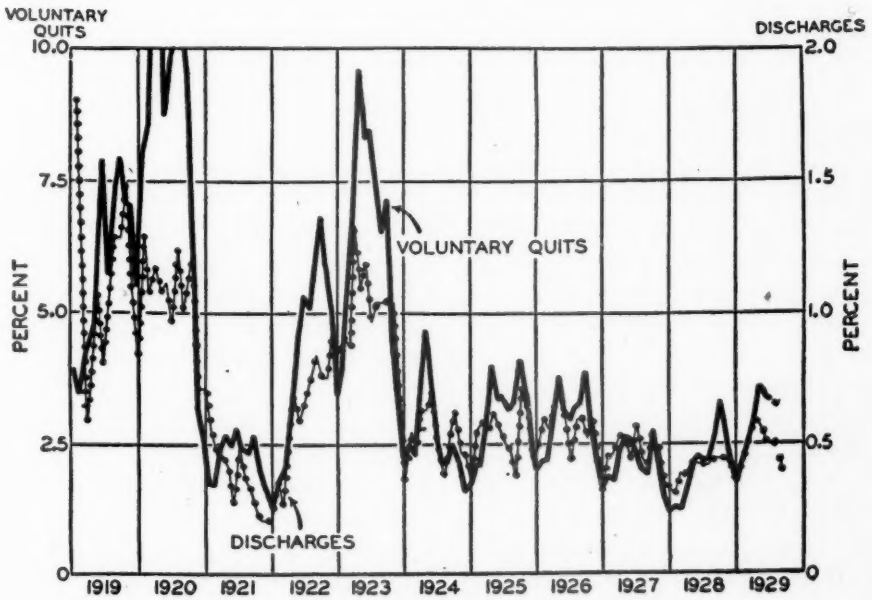

FIG. 2. VOLUNTARY QUIT AND DISCHARGE RATES
Adjusted to Standard Month

rising in the boom and falling in the depression period. These two curves, like those of figure 1, have since 1921 responded to economic conditions in a manner similar to their responses before that time—but not in such a violent manner in the later years.

The fact that all of these curves have in the latter half of the post-war period fluctuated within narrower ranges, and on lower levels, than in the first half of the period is of course no indication of lesser industrial activity and prosperity but rather a more sane and stable prosperity. The stabilization movement has influenced personnel management as it has production and other management fields. Our impression is that a more conservative policy is leading industrial executives to hire or fire or lay off in more orderly fashion rather than in "fits and starts" as they formerly did; this naturally reflects itself also in reduced counter-bidding for labor and therefore lower quitting rates. Although the spread of the stabilization idea is probably not the sole cause, we believe it to be the chief cause of the lower levels and narrower ranges which have characterized all the turnover variables since 1924.

(*Manuscript received July 20, 1929.*)

TABLE 1

Accession rates

(Standard month)

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
January	9.5	10.6	2.6	4.9	10.4	4.9	4.5	4.8	3.1	2.8	5.0
February	4.5	10.4	2.3	4.8	9.3	3.9	3.8	4.3	3.2	2.5	4.7
March	6.3	11.9	2.7	5.9	10.4	3.4	4.4	4.8	3.7	3.0	5.1
April	6.8	10.6	2.9	6.5	11.7	3.9	4.6	4.3	3.9	3.3	5.9
May	7.0	11.2	3.3	9.3	12.0	2.7	3.9	5.1	4.1	4.0	5.0
June	9.1	15.3	1.8	9.0	13.0	2.7	5.9	4.7	3.7	3.5	5.1
July	17.0	14.7	1.2	10.0	11.3	2.6	5.5	4.6	3.2	4.0	5.1
August	12.1	12.7	1.5	10.8	7.4	2.7	6.7	5.6	3.4	4.7	4.2
September	12.8	11.2	2.1	9.2	8.4	3.1	6.9	5.7	3.6	4.7	
October	18.5	7.0	5.2	10.0	6.8	2.8	6.2	4.9	3.5	4.8	
November	10.2	3.6	3.9	8.2	4.0	3.6	5.4	3.3	2.6	4.1	
December	0.9	2.5	3.5	7.7	3.4	3.4	4.0	2.3	2.0	3.2	

TABLE 2

Total separation rates (sum of quits, discharges and layoffs)

(Standard month)

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
January	9.4	9.7	6.3	2.8	5.4	3.7	3.1	3.3	3.5	2.3	3.1
February	5.9	9.3	4.1	2.5	6.4	2.9	2.8	3.1	2.8	2.2	3.5
March	5.7	13.2	5.6	3.4	8.7	4.9	4.1	4.3	3.5	2.8	4.1
April	5.7	12.8	4.9	4.2	10.7	5.9	5.2	5.0	4.0	3.1	4.6
May	6.5	10.1	4.1	5.6	9.8	5.2	4.5	4.3	3.7	3.5	4.5
June	8.7	10.7	4.7	6.2	9.4	3.9	4.2	3.8	3.7	3.2	4.2
July	7.1	11.9	4.3	6.2	9.1	3.2	4.1	4.5	3.1	3.2	3.8
August	9.0	12.0	4.3	7.1	8.0	3.3	4.2	4.4	3.1	3.5	3.8
September	9.2	10.7	5.3	7.8	8.6	3.7	5.1	4.8	3.7	4.1	
October	8.7	8.7	3.3	7.0	6.1	3.4	4.6	3.7	3.5	3.5	
November	8.0	6.9	2.7	6.2	4.7	2.9	3.4	3.3	2.6	2.9	
December	6.4	7.3	2.9	4.5	3.0	2.5	3.0	2.6	2.3	2.5	

TABLE 3

Voluntary quit rates

(Standard month)

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
January	4.0	8.2	1.8	1.6	4.1	2.6	2.2	2.3	2.0	1.3	2.3
February	3.2	8.2	1.6	1.8	5.5	2.2	2.0	2.1	1.7	1.2	2.6
March	4.3	11.9	2.5	2.2	7.2	3.8	3.0	3.0	2.5	1.7	3.1
April	4.5	11.7	2.7	3.0	9.5	4.7	4.0	3.8	2.7	2.1	3.6
May	4.9	8.9	2.5	4.7	8.5	3.6	3.4	3.2	2.7	2.4	3.5
June	7.8	9.7	2.8	5.3	8.4	2.5	3.4	2.9	2.4	2.2	3.2
July	5.8	10.4	2.5	5.2	7.8	2.2	3.2	3.3	2.1	2.3	3.0
August	7.5	10.7	2.4	6.0	6.6	2.2	3.4	3.4	2.0	2.7	2.9
September	7.9	9.4	2.7	6.8	7.1	2.5	4.1	3.9	2.7	3.3	
October	7.2	6.1	2.1	5.9	4.6	2.3	3.6	2.7	2.2	2.7	
November	6.9	3.2	1.7	5.0	3.1	1.6	2.5	2.1	1.5	2.1	
December	5.6	2.5	1.4	3.5	2.2	1.8	2.1	1.7	1.3	1.7	

TABLE 4

Discharge rates

(Standard month)

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
January	1.9	1.4	0.6	0.4	1.0	0.6	0.6	0.6	0.5	0.3	0.4
February	1.2	1.0	0.4	0.2	0.8	0.4	0.5	0.5	0.4	0.4	0.5
March	0.6	1.2	0.5	0.6	1.4	0.6	0.6	0.7	0.5	0.4	0.6
April	0.8	1.1	0.4	0.7	1.1	0.6	0.6	0.7	0.5	0.4	0.6
May	1.1	1.1	0.3	0.6	1.2	0.7	0.6	0.6	0.4	0.4	0.5
June	0.8	0.9	0.5	0.7	0.9	0.5	0.5	0.4	0.6	0.4	0.5
July	1.1	1.3	0.4	0.8	1.1	0.4	0.5	0.6	0.5	0.4	0.4
August	1.3	1.0	0.3	0.8	1.1	0.6	0.4	0.6	0.4	0.4	0.4
September	1.3	1.1	0.2	0.7	1.0	0.6	0.7	0.5	0.5	0.4	
October	1.5	1.3	0.2	0.8	1.1	0.5	0.6	0.6	0.5	0.4	
November	1.1	0.7	0.2	0.9	0.7	0.5	0.5	0.5	0.3	0.4	
December	0.8	0.6	0.2	0.8	0.4	0.4	0.5	0.3	0.3	0.4	

TABLE 5

Layoff rates

(Standard month)

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
January	3.5	0.1	3.9	0.8	0.3	0.5	0.3	0.4	1.0	0.7	0.4
February	1.5	0.1	2.1	0.5	0.1	0.3	0.3	0.5	0.7	0.6	0.4
March	0.8	0.1	2.6	0.6	0.1	0.5	0.5	0.6	0.5	0.7	0.5
April	0.4	0.0	1.8	0.5	0.1	0.6	0.6	0.5	0.8	0.6	0.5
May	0.5	0.1	1.3	0.3	0.1	0.9	0.5	0.5	0.6	0.7	0.5
June	0.1	0.1	1.4	0.2	0.1	0.9	0.3	0.5	0.7	0.6	0.5
July	0.2	0.2	1.4	0.2	0.2	0.6	0.4	0.6	0.5	0.5	0.4
August	0.2	0.3	1.6	0.3	0.3	0.5	0.4	0.4	0.7	0.4	0.5
September	0.0	0.2	2.4	0.3	0.5	0.6	0.3	0.4	0.5	0.4	
October	0.0	1.3	1.0	0.3	0.4	0.6	0.4	0.4	0.8	0.4	
November	0.0	3.0	0.8	0.3	0.9	0.8	0.4	0.7	0.8	0.4	
December	0.0	4.2	1.3	0.2	0.4	0.3	0.4	0.6	0.7	0.4	

News Notes

PERSONNEL RESEARCH FEDERATION

An unusually interesting and valuable program is to be presented at the Eighth Annual Autumn Conference of the Personnel Research Federation to be held in the Engineering Societies Building, 29 West Thirty-ninth Street, New York, November 15 and 16.

An investigation which has been in progress for over two years at the Western Electric Company in Chicago will be reported and discussed. This is a fundamental study of the psychological and physiological factors affecting the worker and his output. Program speakers include John Dewey, Stuart Chase, and Frances Perkins. Complete details of the meeting will be published in the November Service Bulletin.

PURDUE WABASH CONFERENCE

The Purdue-Wabash Conference of College Personnel Officers with the American Council on Education and the PERSONNEL RESEARCH FEDERATION coöperating, presents an interesting program for each of the two days it convenes.

The sessions on October 28 will be held at Purdue University, Lafayette, Indiana, with J. E. Walters in charge. The talks for that day will be:

"Techniques of College Personnel Work," J. A. Humphreys, Oberlin College.

"College Personnel Methods from the Engineering Viewpoint" A. A. Potter, Purdue University.

"The Program for Austin Scholars," D. T. Howard, Northwestern University.

"Personality Development in the Colleges," Daniel A. Robertson American Council on Education.

"Personality Development as Revealed by Case Studies of Problem Students," E. B. Harper, Kalamazoo College.

"Personnel Procedures in Education," L. B. Hopkins, President, Wabash College.

The schedule of addresses to be held the following day at Wabash College, Crawfordsville includes:

"Technique of College Placement," John D. Beatty, Carnegie Institute of Technology.

"Student Personnel Research," Edward S. Jones, University of Buffalo.

"What Industry and Business Expects of College Personnel Work," General R. I. Rees, American Telephone and Telegraph Company.

"Vocational Guidance in Higher Education," C. S. Yoakum, Northwestern University.

"Techniques of College Personnel Records," R. A. Brotemarkle, University of Pennsylvania.

Actual techniques used in college personnel work,—personality development, placement, vocational guidance, and records will be discussed in detail.

ACTIVITIES OF MEMBER ORGANIZATIONS

Vocational Service for Juniors

The place of a disinterested private organization in securing the improvement of a public service was shown in the success of the movement to create a separate Division for Junior Placement in the New York State Department of Labor. The division started on its career July 1, with Miss Clare L. Lewis, widely experienced in child labor and employment problems, serving as its head. Though the appropriation on which it will have to work for the next twelve months is small, only $20,000, Miss Frances Perkins, Industrial Commissioner, and her appointee Miss Lewis are planning to make the most of every resource and to create a section that will be its own argument for better financial support.

The drive for the separation of the junior

and the adult employment service started last fall, when the Vocational Service for Juniors submitted to James A. Hamilton, then Industrial Commissioner, a budgeted plan based on this organization's experience in operating free placement bureaus in Manhattan. This plan called for an annual appropriation of $106,000. It was approved and went with the rest of the Labor Department budget to Albany, where it might have been lost in the shuffle but for the fact that twenty-two civic and welfare groups rallied to its cause.

The Chamber of Commerce of the State of New York passed favorable resolutions and circularized its members. The State Federation of Labor, The Woman's Trade Union League, the Welfare Council of New York City, the State League of Women Voters, the Public Education Association, the State and City Federation of Women's Clubs, the Consumers' League of New York, the Vocational Adjustment Bureau and equally important bodies gave vigorous backing. They did not prevent the cut in the appropriation, but at least the proposition lived and went through.

Miss Perkins and Miss Lewis intend to utilize this general interest to eke out the insufficiencies of the staff. Only five new counselors can be engaged, and the division includes thirteen employment offices situated in continuation schools in Albany, Buffalo, Syracuse, Rochester and New York City. The present workers will be retained, but as these offices have been operated as part of the adult service, with little attempt to deal with the junior job-hunters as a special problem, a great deal of reorganization and training will be necessary. Consequently one of Miss Lewis's immediate tasks will be to form advisory committees in each city, composed of local industrial, labor and welfare leaders, whose coöperation is expected to help steer the new division.

For a number of years Miss Lewis has been head employment counselor for the Vocational Service for Juniors, stationed at its placement bureau in the West Side Continuation School, and she will use this as a training school for the State workers. The methods she developed here she will carry into her new work. Every boy or girl who applies for a job will receive individual attention. Those who do not need to work, who left school from restlessness or dissatisfaction with the subjects they were forced to study, will be urged to return and get more education, and the counselor's influence will be used to shift the maladjusted into the right classes.

Those who must work will be provided with the best available jobs, and every place to which a child is sent to work will be visited beforehand. The task the new Division faces is large for the combined registration of the continuation schools where State employment offices are operated is over 65,000, and the number of children who leave school each year to take out working papers is very large.

Boston Elevated Railway

For the eighth successive year the Boston Elevated Railway offers to its employees a series of educational courses. The programs have been selected yearly by a committee of executives representing all divisions of the utility. This committee has announced as its choice for the 1929–1930 season "those courses which have proven popular." The first class for employees sponsored by the company was in practical electricity. From this beginning in 1922, there has been developed through interest manifested in voluntary and sustained attendance the following significant curriculum available during the current term:

Transportation Problems
Principles of Investment
Accident Prevention
Supervised Reading
Selling Car-rides
Practical Supervisory Problems
Foremen Conferences: Discussion Groups for Supervisors
Boston Elevated Forum: for the Discussion of Departmental Problems
Public Speaking;

and particularly for women employees

Arts and Crafts
Home Nursing and First Aid
Secretarial Course

National Committee for Mental Hygiene

Progress is being made in the organization of The First International Congress on Mental Hygiene, to be held in Washington, D. C., May 5–10, 1930. Educators, psychiatrists, other physicians, public officials, social workers, industrialists and many others from all over the world are expected to be present when the Congress convenes.

Herbert C. Hoover has honored the Congress by accepting the position of honorary president. Already twenty-six countries are represented on the Committee on Organization, of which Dr. Authur H. Ruggles, of Providence, R. I., is chairman. Dr. William A. White, of Washington, D. C., is president of the Congress, and Clifford W. Beers is Secretary-General. The Congress is being sponsored by mental hygiene and related organizations in many countries.

Questions to be discussed at the Congress will include the relations of mental hygiene to law, to hospitals, to education, industry, social work, delinquency, parenthood and community problems. A world-wide view of mental hygiene progress will be given. The subject will be discussed also in specific application to the maladjustment problems of individuals, special attention being probably given to childhood, adolescence and later youth. It is the contention of those promoting the Congress that mental hygiene has to do with the conservation of mental health in general, not merely with nervous and mental diseases. The point of view of clinical diagnosis and treatment will be considered, as well as that of administration of institutions and agencies.

Basic expenses of the Congress are being underwritten by the recently organized American Foundation for Mental Hygiene. Opportunity will be afforded for acquaintance among delegates of the various countries, and translations, together with other conveniences, will facilitate comprehension of all that may be said in unfamiliar languages. Administrative headquarters have been opened at 370 Seventh Ave., New York City, where John R. Shillady, Administrative Secretary, is in charge. A membership fee of $5 (including the Proceedings) has been fixed.

American Federation of Labor

Principal among the subjects discussed at the Annual meeting of the American Federation of Labor in Toronto were: Injunctions, low standard of wages in certain industries, unemployment caused by the introduction of new production processes, and the discharge of workers over forty-five.

William Green, Frank Morrison, and Martin F. Ryan were unanimously reëlected as President, Secretary and Treasurer, respectively of the organization. Boston was selected as the location for the next convention.

I. R. I.

A preliminary informal report of the conference of the International Industrial Relations Association (I. R. I.) held at Schloss Elmau, Oberbayen, Germany, this summer as been received. Sixty-three representatives from fifteen different countries attended. The subject of discussion was methods of promoting satisfactory human relations in industry which is rationalized or scientifically managed. The report gives this summary of the conference:

"Every section of industrial thought and experience was included—production managers, research workers, employers and employees. These were brought together by their keen interest in the world-wide need for raising the standard of life by increased production and wider distribution of goods and services.

"Rationalization under various forms and names held the central place in discussion and the fear of unemployment as a consequence of rationalization was evident on the employees' side. Scientific management was described in the widest possible sense, based on the best practice in Europe and the United States, as that management which would best coördinate all activities in the workshops and in an industry to the end of producing goods and services with the least waste of human effort and material resources. The evils which experience showed have followed from various systems

of intensifying labour and increasing speed were shown to be due to misunderstood and misapplied methods of management, which are not truly scientific. It was pointed out that the economic crisis in which all industrial countries are more or less involved can only be met by a fuller application of science to industrial problems. Higher standards of life protected against unemployment and insecurity, which is at present found in all countries, can only be attained by a thorough-going application of technical skill combined with understanding of human relations."

AMERICAN STANDARDS ASSOCIATION

A movement that inevitably will be reflected in future industrial personnel activities,—particularly in the techniques of employee selection and training—is the recent drive inaugurated by the American Standards Association for national industrial standardization. Control of national standardization policies has been for the past ten years in the hands of engineers and scientists who directed the activities of the American Engineering Standards Committee,—organized in 1918. The interest of industrial executives,—aware of the vast savings to be made through standardization—in the work of the Committee led to its reorganization in November, 1928, at which time the name of this national federation of technical, trade, and industrial organizations was changed to the American Standards Association. The final step in this administrative reorganization was the appointment this month of the following twelve first line executives representing nine major industries as the Association's first Board of Directors: Quincy Bent; George Burgess; Cloyd Chapman; C. L. Collens; Howard Coonley; L. A. Downs; Bancroft Gherardi; F. E. Moskovics; W. J. Serrill; C. E. Skinner; M. S. Sloan; R. J. Sullivan. The official announcement of the personnel of the Board contains this statement, signed by J. A. Farrell, Chairman of the Advisory Committee: "The participation of trade and technical associations in the direction of the Association's activities, and of industrial and business leaders in carrying on its work is highly desirable."

THE AUSTRALIAN INSTITUTE OF INDUSTRIAL PSYCHOLOGY

The Australian Institute of Industrial Psychology has issued its annual report for 1928–1929,—the second year of its existence. Progress is reported in "the application of the methods and discoveries of science to problems of industrial and business life." The activities during the year included the installation of a testing service for the purpose of vocational guidance; the standardization of a series of office tests; a survey of occupations for juniors; and investigations of secondary educational facilities in business and salesmanship. Projects in the application of Industrial Psychology to business were carried on in a department store, a municipal office, and in a business college. With a small staff, in a small country this young Institute is to be congratulated on its achievements, as is the Chamber of Manufacturers "which," as the report states, "continues to afford the valuable assistance so indispensable in the early days of an Institute."

TO STUDY PUBLIC EMPLOYMENT BUREAUS

Frances Perkins, Industrial Commissioner of the State of New York has announced the appointment of a committee to study the public employment agencies maintained in New York City by the State of New York.

The committee is to supervise the study, and will be composed of: Glenn Bowers, Stuart Chase, J. Byron Deacon, William Hodson, Sam A. Lewisohn, F. A. Silcox, John Sullivan, and Leo Wollman. Mr. Lewisohn represents the Merchant's Association; Mr. Chase, the Labor Bureau, Inc.: Mr. Wollman, the Amalgamated Clothing Workers, and Mr. Sullivan, the State Federation of Labor.

Miss Mary LaDame, formerly of the Russell Sage Foundation will do the actual work. The study is being undertaken, said Miss Perkins because "of the feeling that while we have a pretty good public employment service in this State, this service ought to be a great deal better."

"The survey," she continued, "will go into such matters as the suitability of the

present location of the State's employment offices, with reference to the industries served; the layout of the office with reference to the applicants served; the privacy of the interview, and the avoidance of crowding. It will also go into the entire field of personnel, examining the duties and salaries of persons in the service for the last ten years and comparing salaries to those of equivalent positions in private agencies.

"The relative demand for men, women and young workers will be examined, as will the racial and national distribution of applicants, the reception afforded different classes of applicants, and the method of keeping in touch with applicants. The method of interviewing applicants and the extent to which interviewers visit employers and familiarize themselves with actual working conditions will be studied.

"All the forms, records and files of the public employment offices will be examined, the procedure of the public employment offices in industrial disputes looked into, and the opinions of employers and labor organizations on the usefulness of New Yord City offices obtained and analyzed."

EIGHTEENTH ANNUAL SAFETY CONGRESS

The responsibility of the city and the community in accident prevention was a heavily emphasized theme running through the proceedings of the Eighteenth Annual Safety Congress which was held in Chicago, September 30 to October 4, 1929. National experts reported on the most modern practical methods in city-wide coöperation in the lessening of traffic, home, and school accidents. Seven thousand delegates and guests were in attendance at the Congress. Safety engineers, civic, industrial, and educational leaders made up the roster of the three hundred fifty speakers on the program of the Congress. The 125 sessions included 27 Industrial Divisions devoted to specific safety problems in as many different industries; and, in addition six special industrial divisions covered the field of Industrial Health and Industrial Nursing. The exhibition of safety appliances and educational devices was the most complete ever displayed at a congress.

RELIGIOUS EDUCATION ASSOCIATION CONFERENCE

The Second Annual Conference on Research of the Religious Education Association was held September 27–29 at the Chicago Theological Seminary.

With a view to securing a continuous and cumulative series of discussions under optimal conditions, the number of invited participants were limited to thirty-five, from such fields as education, psychology, psychiatry, sociology, religion and religious education.

Seven sessions were held. Guided by the experience of the conference of 1928 and the expressed opinions of those who attended, it was decided to have no set papers but to organize carefully planned round tables on the following topics under the leaders named:

1. Instruments of Research, L. L. Thurstone.
2. Life History and Case History Methods, E. W. Burgess.
3. Controlled Experiments, John E. Anderson.
4. Methods in Community Study, Arthur L. Swift, Jr.
5. Methods and Instruments in Curriculum Research, Ernest Horn.
6. Bases for Present Standards of Value, S. A. Courtis.

The final session was reserved for a summary of the conference,—a stock-taking. Here the attempt was made to formulate the promising fields and projects of research which might be undertaken.

PUBLIC EMPLOYMENT SERVICES CONVENTION

The International Association of Public Employment Services of the United States and Canada held last month in Philadelphia its seventeenth annual convention. Twenty-three of the States, and seven Canadian provinces were officially represented as well as the federal governments of the two countries. Many addresses followed by discussion were delivered on various subjects relating to employment. The readjustment of employees displaced by labor-saving machinery, and the agita-

tion for a more definite clearing house whereby workers can be more readily moved from places of unemployment to other locations where their services are in demand were major topics considered. In order that the purposes of the organization may be better accomplished the association hopes for a larger representation from industrial corporations at its next convention, which will be held September 1930, in Toronto.

AMERICAN MANAGEMENT ASSOCIATION

Seven of the nine general topics announced for discussion at the Autumn Convention of the American Management Association concern personnel problems. Executives from representative industrial and commercial firms will present papers on

Compensation of Executives
Research Activities of Companies
Pensions
Employee Training
Executive Training Program
Measuring, Standardizing, and Compensating for Office Operations
Branch Office Management

The Convention meets at the Hotel Statler in Detroit, October 29, 30, 31, and November 1, 1929. The complete program may be secured from the Association's headquarters: 20 Vesey Street, New York.

NEW YORK UNIVERSITY

The School of Education in coöperation with The National Junior Personnel Service is offering for the current academic year a series of courses on Counseling, Guidance, and Personnel Service, for Educational and Vocational Counselors, Advisers of Boys and Girls, Deans of Men and Women, Club Leaders, Social Workers, Teachers, School Administrators, and others interested in the personnel problems of youth.

The courses deal with all phases of counseling—educational counseling which carries over into the adult field and counseling for vocational guidance.

New courses offered for the first time in the academic year 1929–1930 include: Character Guidance, Placement, Principles and Practices for Continuation and Other School Officials, Personnel Responsibilities for Training and Education in Business; Women in Business, Industry and the Professions, and Labor Problems in their Relation to Vocational Counseling.

PERSONAL ITEMS

The PERSONNEL JOURNAL is fortunate in having secured Dr. DOUGLAS FRYER, Chairman of the Department of Psychology, New York University, as its Book Review Editor. Dr. Fryer takes over the responsibility with this issue: evidences of the new directorship can be noted in some slight modifications in the make-up of the section.

CLARENCE S. YOAKUM has been appointed Dean of the College of Liberal Arts at Northwestern University.

The personnel and training division of the Procter and Gamble Company has acquired two men prominent in personnel research activities: H. E. BERGEN, formerly Personnel Director for the Henry L. Doherty Company, New York, and W. E. PARKER from the faculty of the University of Michigan.

Book Reviews

PERSONNEL PLANS TRIED

Labor Policies of the National Association of Manufacturers. University of Illinois Studies in the Social Sciences, March, 1927. By Albert Guilford Taylor. Urbana: University of Illinois, 1928. Pp. 184.

Supplemental bonuses for wage workers, supervisors and executives. National Industrial Conference Board. New York: Author, 1927. Pp. 57.

Classification and compensation plans. Civil Service assembly of the United States and Canada and the Bureau of Public Personnel Administration. Washington, D. C.: Author, 1928. Pp. 24.

Foreman training. By George F. Mellen. New York: McGraw Hill Book Company, 1928. Pp. 58.

REVIEWED BY ARTHUR HOWARD SUTHERLAND

This group of fact finding studies covers several fields—labor policies, methods of payment and foreman training.

The study by Mr. Taylor is not an attempt to evaluate the usefulness of the organization. He devotes himself to one of its activities and attempts to treat this segment of work descriptively. The study of supplemental bonuses will be of interest to all corporations and personnel departments which have been experimenting or hoping to experiment with incentives. A short chapter is devoted to estimates of the purposes and to the success of the various plans. The study by the Civil Service Assembly is theoretical and proposes a guide to dealing with positions. The foreman training principals are the result of conferences with foremen and executives during a number of years and is compiled and condensed to provide the backbone of a course of training for other foremen. This study is general in character and must be reapplied to a specific situation which the reader may be more familiar with.

The National Association of Manufacturers was organized in 1896 to promote foreign trade, to foster commercial education, but without a labor policy. Six years later it formally inaugurated a militant policy of opposition to labor unions and their organized attempts to advance their own interests.

In more recent years these policies have been reformulated and are now described as an effort to promote public progress and general prosperity. Likewise The American Federation of Labor takes the stand that it is the protector of the peoples' interests. Thus though there is harmony in the formulation of purposes, the policies are strikingly opposed. The Manufacturers Association opposes unionism and would exterminate the system. It is built upon the idea that the employers' interests are also those of society in general, including the working class members.

The Association conducts propaganda through the schools, the church, the press, and by other means. It endorses and condemns party candidates, conducts lobbies and bids for public support through its advocacy of certain humanitarian and social measures. In the view of the author of this monograph, this is not always consistently done. He estimates that the most significant result of the work of the Association has been its influence upon legislation.

In the report upon *Supplemental Bonuses for Wage Earners, Supervisors and Executives* it is shown that wage earners in 107 companies, to the number of 135,228, partici-

pated in bonus plans based on regularity of attendance, length of service, improvement of quality, prevention of waste, reduction of costs, prevention of accidents, shipments and general merit. Amounts of bonus varied from three cents per hour to 10 per cent of wages. In 17 companies employing 5000, the average expenditure in bonuses amounted to approximately $75, or 5 per cent of the annual earnings. Employers vary in their estimates of the value of the plans.

In 77 establishments, supervisory employees draw bonuses for such additional items as maintenance of schedule, suggestions, arrangement of department, earnings of department, record of sales and costs compared with investment. Payment varies from a single annual payment to smaller payments in cash at each pay period. In a few cases payment is made in stock.

In thirty-three companies studied, executives draw bonuses for general merit, savings between budgeted and actual expenses, increased sales, conspicuous service, increased profits above quota, decrease in defective product, and general factors such as operating ratio, satisfactory personnel relations, etc.

Various civil service practices and ideals have been condensed into a set of principles, and adopted. These are reported in the bulletin, *Classification and Compensation Plans*, and will be briefly abstracted. The duties and responsibilities of each position should be analyzed; the positions grouped on the basis of the analysis; each position assigned to some group so formed; a group specification written to facilitate the allocation of new positions. The description of duties and responsibilities of each position should be written by the incumbent, supplemented by an additional but separate report by the supervisor. There should be provision for constant revision, of the Classification Plan under administration by the Personnel Department.

The Compensation Plan should adapt itself to the foregoing, with rules and policies clearly stated as to variations of administration, such as salary adjustments of individuals, classes of positions, or series of classes. Compensation Plans should not provide for automatic increases, since this policy creates an obligation to provide such additional funds from taxation, and also, since advancement in salary should be based upon increasing value of service. The Compensation Plan should be administered by the fiscal or budget agency.

Foreman Training "is not the work of a single mind but is a compilation of the net results of the various conferences held in the Extension Department of Pennsylvania State College." These conferences were conducted in over a hundred industrial plants. The installation and operation of training groups for various grades of employees has yielded a considerable amount of information regarding the problems and responsibilities of the foremen.

The book is devoted to problems of human nature. While foremen have their relation to the cost department, their greatest responsibility is that of discovering the latent talents of men and directing and supervising these abilities so that the men will work more happily and with less friction. The problems of management reflect immediately in the cost figures. Co-operation of all men is necessary in the teamwork of a force. Discipline must extend from above downward in order that the team may function. And it cannot be forced. Freedom of choice on the part of members of the team is essential to solidarity. Advices in the handling of men—from selection to discharge are included.

Especially good is the chapter on supervision. The supervision which means discovery and correction is of less value than that which means anticipation and prevention. Supervision means following details with an amount of attention which accords with the importance of the detail. The foreman's job can be broken down into elements or units from this standpoint. He must devise checks so that information as to the status of work may come to him systematically. When the foreman's job goes wrong it is due to lack of foresight and planning with respect to work, and due to lack of leadership with respect to men. Leadership can be developed in a foreman, by himself, by noticing the effects of his own technique.

HUMAN NATURE AND MANAGEMENT

By Ordway Tead. New York: McGraw-Hill Book Company, 1929. Pp. 312.

REVIEWED BY EDWARD S. COWDRICK

Mr. Tead has set for himself the ambitious task of expounding the essentials of labor management on a basis of psychology. In his new book he has gone somewhat deeper perhaps than has any previous writer into the motives and causes which underlie the intricate relationships between employers and employees in modern industry. The book is intended to serve as a complement to, rather than as a substitute for, existing texts in labor problems and personnel management.

The early chapters are given over to a presentation of the principles of psychological science which the author believes are applicable to industrial purposes. Here he restates some of the ideas advanced in his earlier work, *Instincts in Industry*, but he brings to bear upon the subject a matured judgment and the aid furnished by the advancement in psychological and philosophical thought in the last ten years.

With a thoroughly modern viewpoint, Mr. Tead nevertheless refuses to join with any of the conflicting schools of psychological thought. On the contrary, he makes his own selections both as to the area of the field to be covered and as to the theories to be accepted. By this method he has produced a lucid and readable argument, seemingly in no need of his prefatory warning to the reader against "becoming discouraged early in the book."

Upon this foundation of psychology, and with the whole field of industrial relations open before him, Mr. Tead might readily have written a good-sized library. Instead he has held his thesis to 300 pages, partly by an admirably compressed method of composition and partly by selecting a few aspects of personnel administration upon which to lay emphasis.

In a challenging chapter headed "The Integration of Conflicts of Purpose," Mr. Tead skillfully adapts the philosophical conception of integration—as opposed to conflict on one side and to compromise on the other—to the seeming divergencies of interests between employers and employees. He concedes, however, that there are real conflicts that are "not susceptible to absolute and final decision on a scientific basis. Facts can and should illuminate discussion of such points. But they remain points of essential disparity of interest. And further integration will require further inventiveness. In a word, we do not want necessarily to wipe out conflict—because we cannot. We want, rather, to utilize it for ends that different groups see as contributory to their best purposes. We want to keep on attempting to integrate as new conflicts emerge and thus obtain a progressively intelligent and rational control of the wayward and intractable facts of growing and complex experience."

Another chapter is given to the subject of leadership, which the author defines as "that combination of qualities by the possession of which one is able to get something done by others chiefly because through his influence they become willing to do it. It is ability to secure willing action in behalf of an established purpose. Leading means that others follow. The fact of following indicates that action is secured in a desired direction. Ability to lead is ability to get people to act—mentally or physically—toward an objective."

Other sections of the book discuss the creation of morale, the technique of group action, employment and placement, with the emphasis upon psychological methods; education and training, incentives and other methods of arousing interest, and discipline. On the last-named subject Mr. Tead advances the idea of discipline imposed and enforced by the entire group concerned rather than by executive mandate.

The concluding chapter bears the heading "Industrial Democracy Psychologically Viewed." With full recognition of all the misunderstandings that have grown up

around a badly over-worked phrase, Mr. Tead makes his own definition of industrial democracy and builds up an argument for a gradually evolving situation in which economic institutions "are guided and controlled in ways calculated to allow all members of the economic community an opportunity to help formulate its objectives and, also, to realize for themselves in and through their economic life a sense of personal growth, development and realization."

THE ABILITY TO SPEAK

Speech pathology with methods in speech correction. By Sara M. Stinchfield. Boston: Expression, 1928. Pp. 266.

The psychology of speech. By Sara M. Stinchfield. Boston: Expression, 1928. Pp. 331.

Reviewed by Douglas Fryer

The ability to speak, to use one's vocal apparatus efficiently, is a prominent factor in success in many occupations, but it is one as yet given little practical consideration in the selection and guidance of persons in the occupations. Neither the industrial psychologist nor the personnel worker has very much to offer by way of suggestions for the better placement of workers according to speech abilities and the guidance of those with speech handicaps. During recent years, however, there has been an awakening interest in the speech mechanism, in speech training, and in particular, in the correction of speech defects. Several books have been written upon the psychology of language. Clinics have developed methods for the better use of the voice and the correction of bad speech habits.

Two of the leading books in this field, the two listed above, are the result of work in the speech clinic at Mt. Holyoke College by Dr. Stinchfield. Both books are full of suggestions for the personnel executive interested in the speech problems of the worker. The first is the more practical. There is a survey of speech defects, as special handicaps of the individual, and the relation of such defects to social maladjustment and to mental abnormality of both neurotic and feebleminded origin. The principles of speech correction are outlined and exercises for this purpose are given.

The Blanton-Stinchfield Speech Measurements are given in both books. These measurements are divided into two parts. One part requires a subjective rating by the examiner of voice quality, pitch, time elements, enunciation, behavior characteristics, and special speech abilities and disabilities. The other involves an objective measurement of the person's articulation, reading and speech rates, and the scope and use of vocabulary.

The Psychology of Speech—discusses the development of language in relation to the physiology of the speech mechanism. The language of children appears first as emotional expression. Animal vocal expression is emotional. There are suggestions here of the kind of language expression to be expected from the low grade worker. The development of personality is described as bound up in the speech mechanism.

SAFETY AND PRODUCTION

An engineering and statistical study of the relationship of industrial safety and production. A report by the American Engineering Council. New York: Harper and Brothers, 1928. Pp. 40.

Reviewed by Arthur Howard Sutherland

In 1925, The American Engineering Council was asked by the National Bureau of Casualty and Surety Underwriters to undertake an investigation of safety and production. Labor saving machinery has replaced men, but the number of accidents

is on the increase. The hazard per man is greater; although because of the increase in output and the reduction in men, the unit of output entails a smaller percentage of accident. The principal effort therefore is to secure objective data upon the latter phase of the problem, under the thesis "the safe factory is the efficient factory"—or, efficiency in the factory and safety are two aspects of good executive control. The aim is to impress management with its responsibility for controlling the details of production in such a way as to reduce hazards.

The Council found the problem a large and complex one. Increased rate of production depends upon many factors, and safety depends not only upon material surroundings but training and direction of the working force. From the many lines of industry it was difficult to secure data which could be tabulated in comparable form. The Council spent thirteen months getting ready, three months in collecting data, and eight months in writing the report. Five thousand three hundred six companies were asked to co-operate, of whom 21.6 per cent applied data.

In order that management may have before it the cost figures and the statistics regarding accident frequency and severity, a multitude of charts and tables is included in this volume. A scatter diagram is presented in which the location of dots with reference to the axes indicates the difference in amount of increase or decrease in accidents and in production from year to year. The massing of the dots close below the axis indicates that a relatively small effort on the part of management would be required to lift the company from the undesirable to the desirable side. In other words, the data show that a conscientious effort on the part of management will make sharp inroads into the number and severity of accidents.

Special mention is made of the record of the United States Steel Corporation which in thirteen years had reduced accidents 86 per cent; the Union Pacific Shops which have a safety record five times as desirable as the average of other railroads; the Clark Thread Company showing 10,000,000 man-hours without an accident; and one of the duPont plants running eleven years with but one minor accident. Nevertheless seven lines of industry report more than 50 per cent increase in number of accidents; thirteen report more than 50 per cent increase in accident severity.

The report is extremely guarded in its references to the human factor in accidents. One reads with wonder that the "cause" of the accident was "hand tools, flying particles, slipping, chips on the floor, splinters, and the like," and recalls the small boy who was "just holding the dish in his hands when it broke." Management is reminded in this report of production loss in dollars and cents, lost time and motion, upsetting of schedules, disturbance of morale, and accident compensation, but is offered no suggestions as to procedures for correcting the conditions and reducing accidents. This failure to put the spot-light on the human factor in accidents perhaps tends to encourage complacency on the part of management, diverting attention from the necessity of more intensive individual training and management of men.

BRIEFER MENTION

The work of the international labor organization. National Industrial Conference Board. New York: Author, 1928. Pp. 197.

The International Labor Organization was created by the Treaty of Versailles. Official representatives of 55 countries are divided into sections by terms of the treaty and work is through Commissions of Enquiry on special problems, under the supervision of a governing body. Questions regarding interpretation of the provisions of the treaty as to the rights, duties, privileges and responsibilities of the Organization are submitted to the Court of International Justice at The Hague. The purpose of the organization is to collect and disseminate information on all phases

of industrial employment; to overcome the inertia which prevents general adoption of reforms known to be socially and economically desirable. Regulation of Hours of Work, the Six Day Week, Governmental Agencies for Supplying Labor to the Point of Most Active Need, Employment of Women and Children in Industry, Night Work, Accident Compensation, Equality of Treatment of Foreign Workers in any Nation, Occupational Hazards and Diseases, Rest Periods and Facilities for Utilization of Workers' Spare Time, Maritime and Migration Problems are some of the items in the program of the Organization.

Economics: principles and interpretations. By Roy Emerson Curtis. Chicago: A. W. Shaw Company, 1928. Pp. 897.

The author of this elementary text has attempted to describe, illustrate and explain the principles of economics in terms so simple as to be intelligible to the beginner, so practical as to be valuable to every citizen, and yet to treat of problems which will interest more mature students. The divisions and subdivisions of the subject are conventional; the treatment in spots is confessedly the author's own view and not always in accord with orthodoxy. The final chapters are devoted to an effort to evaluate the present economic system as a continuous outgrowth of historical forms, basing the evaluation upon criteria which have been developed in the text.

The author's view regarding personnel problems, in the general scheme of economic life, emphasizes selection, training, and education as desirable features in the conservation of human resources. It is the business of the manager, not of the laborer to create and maintain an organization. Management must not be heard to complain of the intractibility of factors it has undertaken to control.

Business girls: a study of their interests and problems. By Ruth S. Cavan. Chicago: Religious Education Association, 1929. Pp. 97.

This is a study of the life of the normal girl in business. Some 600 girls are included in the investigation which was carried on by means of interview, questionnaire and case history methods among girls that frequent the Y. W. C. A. in various sections of the country. The chief interests of these girls are travel, education, saving money and meeting people. Their chief problems are lack of self-confidence, not enough advance in work, lack of money, show emotion too easily, and lack of men friends. When the problems are grouped many of them center around the personality difficulties of the normal individual. Working problems come next, while religious, moral and family problems are least in importance. The most widespread want and the thing felt the lack of most is an education. A car and better clothes, including a fur coat, are a close second. In answer to the question: "What would you like to be doing when you are 35 years old?", 82 per cent of the girls say they wish to be married while 24 per cent, including a few of those who wish to be married desire to be in business. A widespread cause of emotional difficulties is the office situation with its quarrels, intimacies, petting etc. Business life seems to rank high as a problem center and low as a center of genuine interest for these girls. The monograph is a collection of interesting facts which will help anyone in understanding the unmarried business girl of fifteen to thirty.

Report on prevention of industrial accidents. International Labour Office, Geneva. Boston: World Peace Foundation, 1929. Pp. 219.

The first part of this report gives the official attitude of 26 governments on the subject of public responsibility for industrial accidents, and on the extension of safety research. Subsequent portions contain the opinions of various governments on marking the weight of heavy packages transported by vessels and a discussion of the practical considerations involved. A recommendation for the extension to the maker, as well as to the user, of the responsibility for the lawful construction and equipment of power machinery sold in intrastate commerce is discussed in this report.

Popular psychology. By A. A. Roback. Cambridge, Mass.: Sci-Art Publishers, 1928. Pp. 260.

The author favors the Socratic method. He asks the questions which he believes the layman would ask, and gives the answers of a psychologist. The content of the question is sometimes psychological, sometimes medical, sometimes sartorial, sometimes philosophical: the layman may not be supposed to limit himself to questions which can be answered from a psychology test. Indeed this book would limit its intended usefulness if it followed the strict orthodoxy. Part I is devoted to a brief explanation of psychological terms; Part II deals with some of the phases of psychology which have become popular, and includes sample experiments from the laboratory, a list of the well-known psychologists, psychological organizations, and contributions of several nations to the subject matter. Part III answers a number of questions regarding character analysis and mental measurement.

New Books

PERSONNEL

LLOYD-JONES, ESTHER MCD. *Student personnel work at Northwestern University.* New York: Harper & Bros., 1929. 273 p. $3.50.

LABOR RELATIONS

INTERNATIONAL LABOUR CONFERENCE. *Forced labor; report and draft questionnaire.* Boston: World Peace Foundation, 1929. 320 p. $2.50.

LEESE, CHARLES LEONARD. *Collective bargaining among photo-engravers in Philadelphia.* Philadelphia: University of Pennsylvania Press, 1929. 234 p. $2.50.

VOCATIONAL INFORMATION

AMERICAN TECHNICAL SOCIETY. *Practical business administration.* Chicago: American Technical Society, 1929. 12 v. $39.80.

BRADWAY, JOHN S. *Law and social work; an introduction to the study of the legal-social field for social workers.* Chicago: University of Chicago Press, 1929. 209 p. $1.50.

CUSHING, HARVEY WILLIAMS. *The medical career; an address on the ideals, opportunities, and difficulties of the medical profession.* Hanover, New Hampshire: Dartmouth College, 1929. 53 p. Apply.

GILES, N. B., AND ELLIS, DOROTHY G. *Science of the home.* New York: Wiley, 1929. 161 p. $1.50.

HOLBROOK, HAROLD LYMAN, AND MCGREGOR, A. LEURA. *Our world of work.* Boston: Allyn & Bacon, 1929. 375 p. $1.40.

JOHNSON, MARY HOOKER. *The dean in the high school; a record of experience and experiment in secondary schools.* New York: Professional & Technical Press, 420 Lexington Avenue, 1929. 374 p. $3.25.

MCGREGOR, ANNE LAURA. *The junior high school teacher.* Garden City, N. Y.: Doubleday, Doran, 1929. 299 p. $2.00.

PURIN, C. N. *The training of teachers of the modern foreign languages.* New York: Macmillan, 1929. 126 p. Paper 75¢.

PROCTOR, WILLIAM MARTIN. *Vocations; the world's work and its workers.* Boston: Houghton, 1929. 392 p. $1.48.

YOAKUM, CLARENCE S. *Business and the young accountant; vocational experiences of the college graduate.* Ann Arbor, Mich: University of Michigan, School of Business Administration, 1929. 46 p. 50¢.

YOUNG, JOHN L. *Books from the ms. to the bookseller.* New York: Pitman, 1929. 131 p. $1.00.

EDUCATION

BURTON, WILLIAM HENRY. *The nature and direction of learning.* New York: D. Appleton, 1929. 613 p. $2.25.

CHICAGO PRINCIPALS' CLUB. *Educational measurement;* ed. by Edward E. Keener. Chicago: Author, 315 Plymouth Ct., 1929. 170 p. Paper $1.00.

DEWEY, JOHN, AND OTHERS. *Art and education.* Merion, Pa.: Barnes Foundation, 1929. 359 p. $2.00.

HOPKINS, LEVI THOMAS. *Curriculum principles and practices.* Chicago: B. H. Sanborn, 1929. 620 p. $2.75.

KEESECKER, WARD W. *Laws relating to compulsory education.* Washington, D. C.: Government Printing Office; Bur. of Education, 1929. 74 p. 15¢.

KELLEY, TRUMAN LEE. *Scientific method; its function in research and in education.* Columbus, O.: Ohio State University Press, 1929. 202 p. $2.50.

KNIGHT, EDGAR WALLACE. *Education in the United States.* Boston: Ginn, 1929. 590 p. $2.60.

MUSE, MAUDE BLANCHE. *An introduction to efficient study habits.* Philadelphia: Saunders, 1929. 110 p. $1.00.

OWEN, RALPH ALBERT DORNFELD. *Principles of adolescent education.* New York: Ronald Press, 1929. 442 p. $2.80.

PALMER, ANTHONY RAY. *Progressive practices in directing learning.* New York: Macmillan, 1929. 317 p. $2.00.

REEVES, MARGARET. *Training schools for delinquent girls.* New York: Russell Sage Foundation, 1929. 455 p. $3.50.

RUCH, GILES MURREL. *The objective or new-type examination; an introduction to educational measurement.* Chicago: Scott, Foseman, 1929. 488 p. $2.20.

STRUCK, F. THEODORE. *Methods and teaching problems in industrial education.* New York: Wiley, 1929. 214 p. $2.75.

U. S. BUREAU OF EDUCATION. *Education in the United States of America.* Washington, D. C.: Government Printing Office; Bureau of Education, 1929. 12 p. Apply.

WHITEHOUSE, JOHN HOWARD. *Creative education at an English school.* New York: Macmillan, 1928. 178 p. $1.50.

WILKES, FREDERICK A., AND OTHERS. *Elementary training for business;* rev. ed. New York: Ronald Press, 1929. 362 p. $1.60.

WRIGHT, J. C., AND ALLEN, C. R. *Efficiency in vocational education.* New York: Wiley, 1929. 443 p. $3.00.

ECONOMICS

MOORE, HENRY LUDWELL. *Synthetic economics.* New York: Macmillan, 1929. 193 p. $3.00.

MUMFORD, H. W. AND OTHERS. *Developmental study of a rural-urban trade area.* Urbana, Ill.: University of Illinois, 1929. 77 p. Apply.

SOCIOLOGY

BOOTHE, VIVA B., ed. *Women in the modern world; the changing educational, political, economic and social relationships of women in the United States.* Philadelphia: American Academy of Political and Social Science, 1929. 404 p. Paper $2.00.

CHASE, STUART. *Men and machines.* New York: Macmillan, 1929. 354 p. $2.50.

GEE, WILSON, Ed. *Research in the social sciences;* its fundamental methods and objectives. New York: Macmillan, 1929. 315 p. $2.00.

HERTZLER, J. O. *Social institutions.* New York: McGraw-Hill, 1929. 234 p. $2.50.

McDOUGALL, WILLIAM. *Modern materialism and emergent evolution.* New York: Van Nostrand, 1929. 259 p. $2.75.

OGBURN, WILLIAM F., ed. *Social changes in 1928.* Chicago: University of Chicago Press, 1929. 230 p. $1.00.

TAYLOR, PAUL S. *Mexican labor in the United States valley of the South Platte, Colorado.* Berkeley, Cal.: University of California Press, 1929. 140 p. $1.80.

INDUSTRY

JAVITS, BENJAMIN A., AND WOOD, CHARLES, W. *Make everybody rich; industry's new goal.* New York: B. C. Forbes Publishing Co., 1929. 300 p. $3.50.

PHELPS, GEORGE HARRISON. *Our biggest customer.* Introduction by James J. Davis, Secretary of Labor. New York: Liveright, 1929. 192 p. $2.00.

U. S. WOMEN'S BUREAU. *Standards for the employment of women in industry; fourth edition.* Washington, D. C.: Government Printing Office; Superintendent of Documents. 8 p. 5¢.

MENTAL HEALTH

FRASER-HARRIS, DAVID FRASER, M.D. *The A B C of nerves.* New York: Alfred Knopf, 1929. 234 p. $2.50.

SCHWEB, SIDNEY I., M. D., AND VEEDER, BORDEN SMITH, M.D. *The adolescent, his conflicts and escapes.* New York: D. Appleton & Co., 1929. 365 p. $3.00.

WARTHIN, ALFRED SCOTT. *Old age: the major involution; the physiology and pathology of the aging process.* New York: P. B. Hoeber, 1929. 214 p. $3.00.

PSYCHOLOGY

BODE, BOYD HENRY. *Conflicting psychologies of learning.* Boston: Heath, 1929. 309 p. $2.00

KANTOR, JACOB ROBERT. *An outline of social psychology.* Chicago: Follett Publishing Co., 1929. 434 p. $2.40.

PINTNER, RUDOLF. *Educational psychology.* New York: Holt, 1929. 392 p. $2.50.

STAPLETON, W. OLAF. *A modern theory of ethics; a study of the relations of ethics and psychology.* New York: Dutton, 1929. 286 p. $2.75.

TEAD, ORDWAY. *Human nature and management; the applications of psychology to executive leadership.* New York: McGraw Hill, 1929. 322 p. $3.50.

TITCHENER, EDWARD BRADFORD. *Systematic psychology: prolegomena.* New York: Macmillan, 1929. 289 p. $2.50.

WEISS, ALBERT PAUL. *A theoretical basis of human behavior;* 2nd ed. rev. Columbus, O.: R. G. Adam & Co., 1929. 496 p. $3.00.

WHEELER, RAYMOND HOLDER. *The science of psychology; an introductory study.* New York: Crowell, 1929. 573 p. $3.75.

WILLIAMS, KATHERINE ADAMS. *The reward value of a conditioned stimulus.* Berkeley, Cal.: University of California Press, 1929. 24 p. Paper, 30¢.

TESTS

FRANZEN, RAYMOND. *Health Education tests; a description of the tests used in the School Health Study, with norms for fifth, and sixth grade children, and directions for giving the tests.* New York: American Child Health Association, 1929. 90 p. 90¢; paper 60¢.

Current Periodicals

PREPARED BY LINDA H. MORLEY, *Industrial Relations Counselors, Inc.*

CHILD LABOR

FLETCHER, RALPH, AND FLETCHER, MILDRED. Statistical analysis of juvenile employment in St. Louis. *Journal of the American Statistical Association,* June, 1929, Vol. 25, 174–177.

Based on the methods used in M. B. Hexter's *Juvenile employment and labor mobility in the business cycle.*

COLLEGE MEN IN BUSINESS

BOWEN, W. C. (Personnel Director, International Telegraph and Telephone Co.) Harvesting the college crop. *Nation's Business,* June, 1929, Vol. 17, 100, 102, 103.

Methods of selecting college graduates for work in the International Telegraph and Telephone Co.

DENNISON MANUFACTURING COMPANY

HEYES, ERYING PAUL. History of the Dennison Manufacturing Company. *Journal of Ecomonic and Business History."* August, 1929, Vol. 1, 467–502.

Company history, written by one who had every opportunity to get at first hand information.

ECONOMIC CONDITIONS

Industrial review of the year, July, 1928 to July 1, 1929. *Information Service,* July 27, 1929, Vol. 8, p. 1–7.

Sections on wages and living costs, working conditions; unemployment; industrial relations; strikes and lock-outs; labor movement; labor legislation; labor cases in the courts; labor benefits and

insurance; labor banking; workers, education.

NATIONAL BUREAU OF ECONOMIC RESEARCH. Report on Recent Economic Changes. *Survey*, June 1, 1929, Vol. 62, entire issue.

Reviews of the report by six writers.

ECONOMICS

KUZNETS, SIMON (National Bureau of Economic Research). Retardation of industrial growth. *Journal of Economic and Business History*, Vol. 1, 534–560.

Part of a study made for the Social Science Research Council. Dr. Kuznets is of the opinion that retardation of industrial growth is a fact.

EMPLOYMENT

BERRIDGE, W. A. Employment and buying power. *American Journal of Sociology*, May, 1929, Vol. 34, 1030–1044.

Contribution to a survey of social changes in the United States in 1928.

Fatigue

PAGE, RICHARD M. On supplanting the industrial fatigue concept. *Journal of Business*, April, 1929, Vl. 2, 137–150. (Abstract in *Management Review*, July, 1929, Vol. 18, 235).

Emphasizes the value of changing the point of view from that of observing the loss due to fatigue to that of measuring the cost of energy.

Hours of Labor

FUHS, DR. R. (Chief of Section, International Labour Office.) International regulation of hours of work of salaried employees. *International Labour Review*, June, 1929, Vol. 19, 769–796.

Comprehensive survey, setting out the prospects and possibilities of international regulation. Complementing a report made by the International Labour Office.

HOURS OF LABOR—FIVE DAY WEEK

Progress of the 5-day week. *Monthly Labor Review*, June, 1919, Vol. 28, 1181–1190. Includes tables showing union trades in which the 5-day week or 40-hour-or-less week prevails.

HYGIENE, INDUSTRIAL

TURNER, B. Factory worker and industrial hygiene. *Journal of the Royal Sanitary Institute*, November, 1928, Vol. 49, 286–290. (Abstract in *Journal of Industrial Hygiene*, June, 1929, Vol. 11, 136.)

Progress in textile factories reviewed for the last fifty years.

INCENTIVES

WHISLER, R. F. (Rate and Time Study Department, National Cash Register Co.) "Uses and limitations of group incentives." *Factory and Industrial Management*, July, 1929, Vol. 78, p. 43–46.

INDUSTRIAL RELATIONS

DOAK, W. N. (Editor and Manager *Railroad Trainman;* National Legislative Representative, Brotherhood of Railroad Trainmen.) Consolidation from the railroad employees' viewpoint. *Proceedings of the Academy of Political Science*, June, 1929, Vol. 13, 406–415.

VITELES, MORRIS S. (Department of Psychology, University of Pennsylvania.) Individual adjustment in industry. *News Bulletin, Philadelphia Personnel Association*, May, 1929, No. 46, p. 2–3. (Abstract in *Management Review*, July, 1929, Vol. 18, 235–236.)

There are two sets of factors involved: I. Factors inherent in the work; II. Factors of the mind inherent in the workers.

JOB ANALYSIS

DOLL, EDGAR A. (Director of Research, Training School at Vineland, N. J.) Job analysis as a basis for teaching. *Bulletin of the Taylor Society*, June, 1929, Vol. 14, 134–141.

A study showing how job analysis may contribute to the techniques of education.

OCCUPATIONS

RETAIL CREDIT COMPANY. Chronium plating. *Industry Report*, July, 1929, Vol. 4, 1–6.

One of a series of occupational analyses being issued by this company. Gives valuable information on health, safety and occupational data.

PROFIT SHARING

Profit-sharing and labour co-partnership in 1928. *Ministry of Labour Gazette*, July, 1929, Vol. 27, 234–238.

Statistics covering Great Britain. A continuation of the figures contained in the report on profit-sharing and labor co-partnership published in 1920 and in annual articles subsequently published in the Gazette.

RESEARCH

COES, HAROLD VINTON (Consulting Management Engineer, Ford, Bacon & Davis, Inc.) Reverberations of industrial and business research. *Management Review*, July, 1929, Vol. 18, 219–225.

The author comes to the conclusion that industrial and business research on the scale that it is now being applied has been a factor in the stabilization that has been obtained since 1923.

MILES, G. H. Methods of research in industrial relations. *Journal of the National Institute of Industrial Psychology*, July, 1929, Vol. 4, 373–378.

Emphasizes the difficulty of evaluating the relative importance of material and mental factors in industrial relations. Dr. Miles instances the formation of group attitudes as a mental factor too often neglected, and outlines research methods capable of taking such elements into account.

SAFETY

BINGHAM, W. V. Personality and the accident habit. *Aera*, December, 1928, Vol. 19, 721–723. (Abstract in Social Science Abstracts, July, 1929, Vol. 1, 651.)

Study made of the Boston Elevated Railway Co.

SMITH, CLINTON D. (Superintendent of Personnel, Cleveland Railway Co.) Discovering traits that make unsafe trainmen. *National Safety News*, July, 1929, Vol. 20, 31–32.

Studying accident prone employees reveals many personal causes of accidents.

SELECTION OF EMPLOYEES

BERGEN, HAROLD B. (Manager Personnel Department, Henry L. Doherty & Co.) How personality influences selection and placement. *Bulletin of the Taylor Society*, June, 1929, Vol. 14, 130–133.

Brief discussion pointing to the need for more objective methods of personality measurement and better methods of personality training.

STANDARDS OF LIVING

BERNARD, L. I. Standards of living and planes of living. *Social Forces*, December, 1928, Vol. 7, 90–202. (Abstract in *Social Science Abstracts*, July, 1929, Vol. 1, 705–706.

Suggests the terminology "Standards of living" for scientific criteria and "Planes of living" for practices.

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Employee suggestion systems stimulate ideas. *Aera*, June, 1929, Vol. 20, 324–328.

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BUREAU OF PUBLIC PERSONNEL ADMINISTRATION. Measuring abstract intelligence in personnel work. *Public Personnel Studies*, May-June, 1929, Vol. 7, 69–92. Technical article dealing with methods. Many of the tests in use are explained.

HOLLINGSWORTH, F. N. Testing the man. *Electric Traction*, June, 1929, Vol. 25, 271–275.

Boston Elevated's new psychological laboratory reveals interesting facts about the reactions of car operators.

TRAINING FOREMEN

CADBURY, GEORGE (Managing Director, Cadbury Brothers, Ltd.) Need for training foremen. *Industrial Welfare*, July, 1929, Vol. 11, 221–224.

English experience.

TRAINING SALESMEN

BARNHART, E. W. (Chief, Commercial Education Service, Federal Board for Vocational Education.) Constructive conference in training salesmen and salesmanagers. *Personnel*, August, 1929, Vol. 6, 35–53.

Methods advocated by the Federal Board for Vocational Education. Includes a bibliography.

CROWELL, BRUCE. Retail salesmanship course speeds Knox hat sales. *Sales Management*, May 25, 1929, Vol. 18, 387–431. (Abstract in *Management Review*, July, 1929, Vol. 18, 245–246.

Home study course offered by the Knox Hat Company.

OSBORNE, DAVID R. (Training Director, Studebaker Corporation of America.) Training salesmen in the Studebaker Corporation of America. *Personnel*, August, 1929, Vol. 6, 53–64.

Illustrated by a number of stories from the experience of the writer.

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MCKINSEY, JAMES O. (Professor of Accounting, School of Commerce and Finance, University of Chicago.) Effect of mergers on marketing, production and administrative problems. *Journal of Business of the University of Chicago*, July, 1929, Vol. 2, 326–337.

Section on the position of executives and other personnel in merged companies is of special interest.

VOCATIONAL GUIDANCE

NATIONAL INSTITUTE OF INDUSTRIAL PSYCHOLOGY. Vocational selection in two firms. *Journal of the National Institute of Industrial Psychology*, July, 1929, Vol. 4, 367–372.

Rowntree's and Lewis' Ltd.

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DOUGLAS, P. J. Wages. *American Journal of Sociology*, May, 1929, Vol. 34, 1021–1029.

Contribution to a survey of social changes in the United States in 1928.

WAGES—PAYMENT METHODS

FRAIN, H. LA RUE (Industrial Research Department, University of Pennsylvania.) Methods of wage payment and market comparisons of wages. *Bulletin of the Taylor Society*, June, 1929, Vol. 14, 127–129.

Importance of recognizing differences in methods of wage payment when group experience is used as a basis of wage comparison.

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SAUNDERS, ELEANORA B. Emotional handicaps of the professional woman. *Mental Hygiene*, January, 1929, Vol. 13, 45–61. (Abstract in Social Science Abstracts, July, 1929, Vol. 1, 703.)

Technical exposition of the difficulties now facing women in more responsible positions.

WOODHOUSE, CHASE GOING (Director, Institute of Women's Professional Relations, North Carolina College for Women, Greensboro, N. C.) Married college women in business and the professions. Annals of the American Academy of Political and Social Science, May, 1929, Vol. 143, 325–338.